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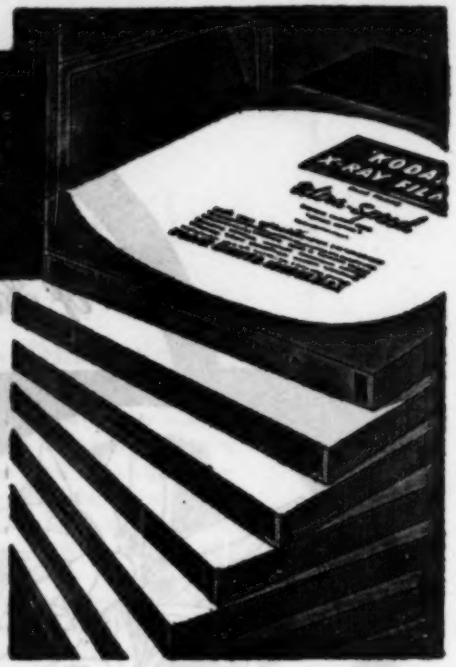

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CONTENTS

Acetyl-Choline—Stimulator and Inhibitor
—R. C. SHUKLA, M.D. 317
Indications for Pulmonary Resection
REEVE H. BITTS, M.D. 323
Tetanus—Its Management
—S. M. GHOSH, F.R.C.S. 328
Labour in Occipitoposterior Position and its Management
—KALIPADA BHADURY, M.B. 331
Senile Enlargement of Prostate—Pathological Aspect
—B. P. TRIVEDI, M.B., B.A.C.T. 333
Occupational Hazards in Coal Gas Manufacture
—C. C. BHATTACHARYYA 335
Case Notes :
A Severe Case of Infectious Hepatitis with Coma
—ABDUS SAMAD, M.B.
AND
S. C. KAPOOR 338
An Unusual Complication after Cataract Operation
—S. C. ROY, M.B. 339
A Misleading Case of Severe Constipation
—K. A. DESAI, L.M.P. (BOM.), L.C.P.S. (BOM.) .. 339
Editorial :
Autonomic Nervous System and Mediation of Nerve Impulses 340
Current Topics 342
Notes and News 346
Correspondence 350
Current Medical Literature 352
Supplement lix

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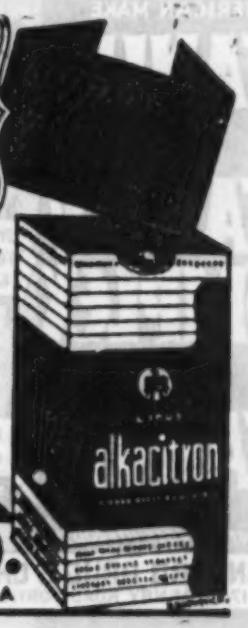

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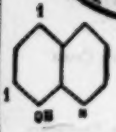

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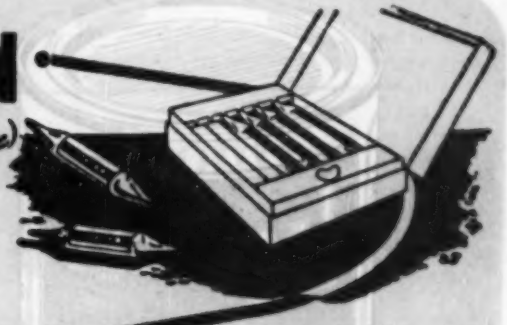

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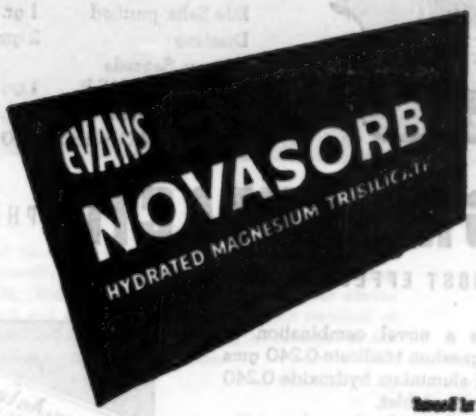

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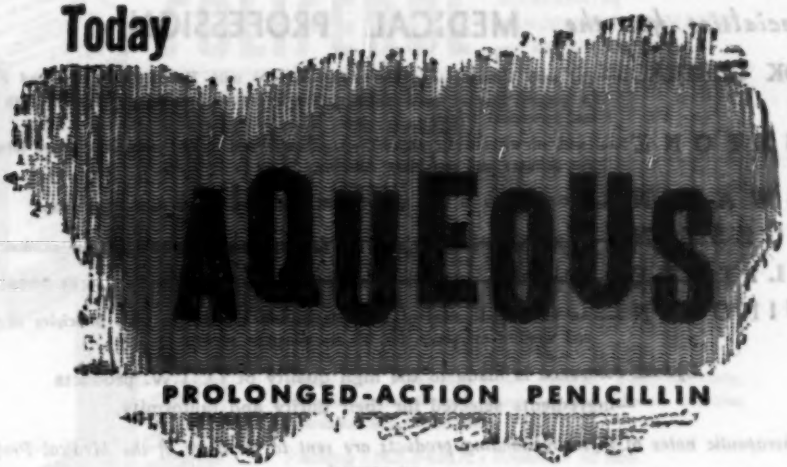

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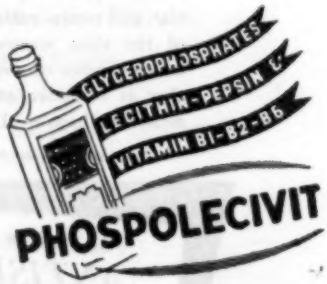

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ACETYL-CHOLINE—STIMULATOR AND INHIBITOR*

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Acetyl-choline is derived from choline which is a constituent of the phospholipide, lecithin, an ever-present constituent of every living thing. As its name implies, acetyl-choline is the acetic ester of choline and was first prepared by Baeyer (1867), but it remained only of chemical interest until Hunt and Tavean (1906) discovered that it possessed marked physiological activity.

The first isolation and identification of acetyl-choline as a natural constituent of the body was made by Dale and Dudley (1929). In the same year Dale in his Croonian Lectures indicated the grounds for a belief that the action of the parasympathetic part of the autonomic nervous system is intermediated by the peripheral release of acetyl-choline.

So far as the heart is concerned the original observation that vagus stimulation caused the appearance of a chemical substance which performed the act of inhibition was made by Loewi (1921). The identificaion of this humoral transmitter with acetyl-choline was made in 1933 by Feldberg and Krayer.

When I set out to perform the experiments described below I therefore accepted it as proven that acetyl-choline is the humoral transmitter of the action of the vagus on the heart. What I desired to find out about this drug was how it acts, and that 'how' is the keynote of my experiments. If I could find some regular constituent of body tissues which regularly antogonised the inhibitory action of acetyl-choline and equally regularly assisted the heart to recover from the effects of acetyl-choline, then it appeared to me that I shall have gained some information concerning the mode of action of the drug.

My experiments have been performed on the perfused hearts of *Rana tigrina* and I have used the method first elaborated and described by Burridge. In brief, he recommends the use of a series of perfusing solutions each differing from any other only in its calcium content. The one standard solution contains:—0·6 per cent NaCl, 0·025 per cent $CaCl_2$, 0·03 per cent KCl, 0·01 per cent $NaHCO_3$ and is designated R. The other standard solution is designated ROCa and differs from R in containing no calcium. By mixing R and ROCa in different proportions perfusing solutions are formed differing only in their calcium content which is then designated as a fraction of R, eg., 2R/5.

The experiments were performed on frogs *Rana tirgina*, and the procedure adopted was the following:

The heart of the frog was exposed by removing the sternum after destroying the brain and the spinal cord. The pericardium was then dissected off and the inferior vena cava was recognised. A portion of the wall of the inferior vena cava was resected, and the perfusion cannula introduced through the hole thus made. Later a slit was made in the apex of the ventricle to let the solution flow off and then the hind portion of the body of the frog was removed so that it could fit up on the cork sheet (Fig. 1). The hook D was then passed through a portion of the musculature of the heart so that pointer P may follow the movement of the heart.

Details of Experiments

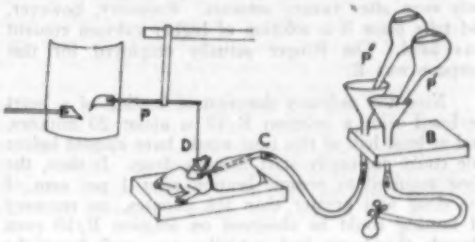

Fig. 1

The two funnels (P' P'') as seen in Fig. 1 with two rubber tubings and clips attached were mounted on the board (B). The height was adjusted to 4-5" above the table so that the solution may flow easily. The drum of the kymograph had three speeds: slow, medium and fast. Ordinarily only the slow speed was used but the medium and, less often, the fast were also used to see the details in the curves.

When the experiments were started the perfusing solution was used first by tilting slantingly a 100 c.c. flask of the perfusing solution over the funnel and corresponding rubber tube connected to cannula (C) as shown in Fig. 1, so that every drop of fluid may be seen going in with air bubbles. In the other funnel the drug dissolved in the perfusing solution was kept

* Read at the Scientific Section of XIII U. P. Provincial Medical Conference held at Kanpur.

in reserve. Whenever the perfusion of the drug was desired the other tube B was connected to the cannula.

Electric shocks could easily be given to the heart when desired by connecting one wire of the secondary coil to the base of heart and the other to the hook.

Whenever any change in solution was made the corresponding change in the drug was also made so that the drug was dissolved in the same perfusing solution which was allowed to flow at a certain time through the heart and only the effect of the drug was noted. For instance if R/10 was the perfusing fluid then acetyl-choline was dissolved in R/10 and next dilutions of drug were also made in R/10 so long R/10 was allowed to flow. When R/10 was replaced by 2R/5 then a fresh stock of drug was taken and different solutions were made in 2R/5 solution. That means that drug was always dissolved in the perfusing solution whatever be its (perfusing solution) composition and the dilutions were also made in the perfusing solution. When the perfusing solution was changed, fresh stock of drug was always taken and dissolved in that solution and so on.

Results

The solution of least calcium content used was R/10, and we note from what was explained above that its calcium content was 0·0025 per cent $CaCl_2$. When this solution holding 1 per cent of acetyl-choline was perfused, there followed almost immediately after it reached the heart, a complete inhibition of the heart. But there was no recovery therefrom when the drug holding solution was replaced by Ringer's solution only even after twenty minutes. Recovery, however, did take place if a solution of higher calcium content was used. The Ringer actually employed for this purpose was R.

Now the ordinary duration of beating of a heart perfused with a solution R/10 is about 20 minutes, and at least half of this time would have elapsed before one could ordinarily start using a drug. If then, the time required to resume beating after 1 per cent of the drug was greater than ten minutes, no recovery of beating could be observed on solution R/10 even though the heart had actually recovered from the effects of the drug. From the capacity of the heart to resume beating on solution, R, I deduced that the time taken by the heart to recover from 1 per cent of drug was greater than the remaining survival time of beating on solution R/10.

The heart which failed to beat again on solution R/10, after 1 per cent acetyl-choline had been used, had not therefore been killed by the drug. It was rather a matter of the time taken for recovery. There were, in fact, two times involved; there was firstly the time taken by the heart to cease visible beating on solution R/10, there was secondly the time taken by the heart to recover from the action of the acetyl-choline. If the second time be longer than the first, then obviously no recovery from the action of acetyl choline can be seen so long as R/10 is the perfusing solution. From the capacity of the heart to beat on solution R instead of R/10, it can be inferred that the recovery time after 1 per cent acetyl-choline was longer than the survival time on solution R/10.

The next experiment with 1 per cent acetyl-choline was done with solution R/5, which contains 0·005 per cent $CaCl_2$ and therefore double the Ca which solution R/10 holds. The heart recovered its capacity to beat when this solution was used, but it took a long time and I found also that the ventricle gave a response to electric shocks before spontaneous beating was resumed. Perfusion with solution R caused the heart to beat at a more normal rate, and the improvement persisted when reversion was made again to solution R/5.

The next experiment with one per cent acetyl-choline was done with solution R. Recovery took place in this case, but there was marked delay, and also the ventricle contracted to excitation by electric currents before spontaneous beating was resumed.

After that I perfused the drug in solution 6 R. Recovery in these cases was rapid and good.

Recovery from the action of one per cent acetyl-choline thus depended on the calcium content of the perfusing solution. With the solution of lowest calcium content, solution R/10, the recovery thereon was nil; with the solution of highest calcium content solution, 6 R, recovery was quick and complete. Solutions of intermediate calcium content gave intermediate results. I therefore concluded that acetyl-choline displaced calcium from the heart, and that there was a time-factor in its replacement which varied with the calcium content of the perfusing solution.

In a communication made to the Physiology Section of the Indian Science Congress at Calcutta, Burridge and Seth pointed out that choline had a marked influence in prolonging the activitty of hearts perfused with solution R/10. This fact I have frequently confirmed and I used hearts previously treated with 1 in 1000 choline for further experiments with acetyl-choline. The choline produced inhibition when it was perfused and then, after the choline had been washed out, the heart not only recovered but would keep beating well over an ordinary working day of six hours when perfused with the solution R/10. Such previously cholinised hearts I used for experiments with acetyl-choline. Some of the results obtained thereby are shown in the tracings of the following figure (Fig. 2).

Tracing A shows the effects which followed the perfusion of one part in one thousand of acetyl-choline. We note that it produced complete inhibition. At R/10 the acetyl-choline began to be washed out with the Ringer's solution and the seeming contraction shown there is only a mechanical effect consequent on this replacement. The onset of this seeming contraction accurately marks when the rubber tube from the Ringer-acetyl-choline reservoir was

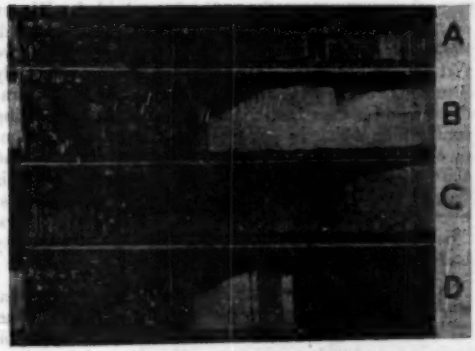

FIG. 2

removed and the commencement of the seeming dilatation accurately marks when the rubber tube from the Ringer reservoir was joined to the perfusion cannula. At P the Ringer was forcibly 'pumped' through the heart to ensure a thorough removal of the drug-holding solution. Each 'stroke' of the 'pump', provided by appropriate squeezings of the rubber tube connection, is marked on the tracing. It is to be observed that the first spontaneous contractions (Sp), appear about five minutes after the Ringer was reperfused and that when they appear they are fairly strong. They are also very slow.

At 'air', air was bubbled through the ventricle and did not appear to have any influence on the course of the recovery.

Tracing C is the direct continuation of A and records the events which took place during and after the use of 10^{-4} acetyl-choine. We note that the inhibition is as complete as in A, but that recovery is not only much quicker but also culminates in the greatly increased activity shown on the right. The acetyl-choline had evidently done more than inhibit.

Tracing B is the direct continuation of C and records use of the same strength or dilution, 10^{-4}, of acetyl-choline as was used in C. We now note that inhibition is not so easily effected as in C, and can ascribe the difference to the fact that the heart now beats better and so is less responsive to drug. There is, however, nothing of significant difference in the recoveries after the two experiments.

Tracing D directly continues B and this time I used 10^{-6} acetyl-choline. The inhibition was not complete, also recovery was much quicker than in the previous experiments.

It may now be observed that the cholinised heart, while it gave the same type of result as the normal heart, is less sensitive to the action of acetyl-choline than is the normal. 10^{-8} acetyl-choline perfused through the normal heart gave complete inhibition from which the heart recovered, 10^{-9}, however, gave preliminary stimulation before it depressed the beats without actually stopping the heart. The next dilution 10^{-10} gave stronger primary stimulation and a smaller depression, while 10^{-11} gave stimulation only. Dilutions 10^{-12}, 10^{-13}, 10^{-14} and 10^{-15} gave only a slight stimulation without any sign of inhibition. In addition these very weak dilutions did more, they kept the heart beating on solution R/10 far beyond its normal time.

In another group of experiments I perfused acetyl-choline through hearts that had been atropinised by previous perfusion through them of 10^{-7} atropine, 10^{-5} acetyl-choline failed to produce inhibition in hearts thus treated, also it failed to give any stimulation. But I did get marked stimulation with 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7}, and 10^{-8} acetyl-choline.

The experiments so far recorded show that acetyl-choline exerts two actions on the frog's heart, a depressing action which culminates in inhibition, and a stimulating action. As is usual with substances exerting two such actions the depressor effect predominates when the drug is in relatively high concentration, and the stimulating action predominates when the drug is used at great dilution. This is not surprising when one accepts the hypothesis that the drug is the natural inhibitor of the heart and the natural stimulator at the synapses of autonomic ganglia. I have, however, to acknowledge a sense of disappointment at the degree of stimulation which I obtained at great dilutions because it seemed to me that it 'ought' to be of the same order as that which is obtainable with adrenaline when it strongly stimulates hearts. Actually it was as much as one can obtain with adrenaline at such a dilution as 10^{-12}, and in addition the drug was found active at greater dilutions than has been found with adrenaline. It seems to me, therefore, that some day we may find at autonomic synapses some other natural drug receptor which takes away the depressor effect of acetyl-choline as surely as does atropine, and yet allows its stimulating action full sway.

In another group of experiments I perfused acetyl-choline, in solution R/10 plus 10^{-6} adrenaline. The addition of the latter, it should be observed, enables the heart to beat well on solution R/10 for many hours. When the strength of the former was 10^{-3}, inhibition was obtained as before and, after washing out with the adrenalinised Ringer, the heart began to beat feebly some ten minutes after this washing out was begun. After lapse of another ten or fifteen minutes, the recorded beats of the ventricle could be as strong as they were before the drug was used.

Inspection of the dilated ventricle, however, showed a very marked change in it. Its shape, for example, was that of a turnip whereas a normally dilated ventricle is shield or thyroid shaped. There was a ring of constriction at the base of the ventricle, and this ring was much more opaque than ordinary heart muscle, and when examined by the fingers it was hard to the touch.

I performed in all some thirty experiments with solution R/10, and 10^{-8} acetyl-choline with adrenaline and that ring of altered muscle was regularly seen. Also, while the recorded beats, after the drug had been washed out, might be as strong as those present before the drug was used, that turnip-shaped ventricle stood, as it were, before my eyes to tell me that all was far from well. I found, however, that a perfusion of solution R would remove the ring, and allow the heart to beat better before than on the Ringer. I thus obtained another line of evidence indicating that the heart after treatment with 10^{-8} acetyl-choline perfused in solution R/10 did not completely recover. Also since the remaining part of the ventricle could contract as strongly as the whole did before, we obtain another line of evidence indicating that acetyl-choline can exert a stimulating action. There is the further point that that ring of contracted muscle seemed able to conduct impulses from auricle to the remainder of the ventricle.

Part of the stimulating action of acetyl-choline is shown as a reduction of the refractory period. The tracings of the next figure (Fig. 3) illustrate how this reduction was traced.

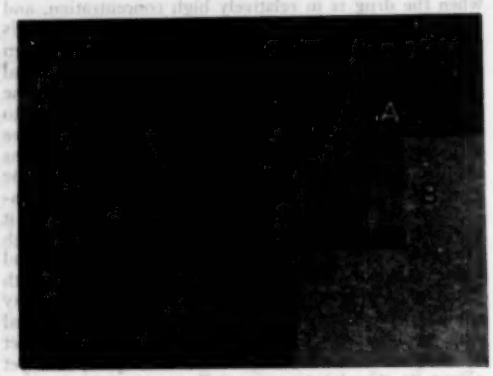

FIG. 3

As in other cases I chose a perfusing solution which would help to bring out the point that I wished to demonstrate, *viz.*, calcium can shorten the refractory period and its effects are added to those of the drug. Hence I used solution R to enhance this particular effect.

The first part of the tracing was taken on the slow moving drum and shows inhibition effect by 10^{-4} acetyl-choline. When this had been done the speed of the drum was increased and the ventricle subjected to faradisation. The immediate reply to this excitation was a contraction which was stronger than the previous spontaneous efforts. This contraction was first sustained, as is shown by the tracing, and then showed slight wavering. Nevertheless in its general characters it shows strong resemblance to the tetanus of ordinary skeletal muscle.

At the arrow faradisation was stopped and we see that the contracture immediately subsided. Ringer was then reperfused and the slow drum speed resumed. Following on this reperfusion of Ringer we observe that spontaneous beating was almost immediately resumed. Some five minutes later the heart was faradised again and as tracing B shows we get a wavering contracture which is less than the height of the spontaneous contractions. After another ten minutes had elapsed, tracing C, the heart was faradised and this time it evoked a series of quickened contractions distinctly less in amplitude than their spontaneous fellows. The results of faradisation were then the same as they had been before the drug was used.

This capacity for showing tetanus is evidence that the refractory period is shortened by acetyl-choline. This action I would hold to be distinct from its inhibitory one, and to be another manifestation of the stimulating action of the drug. It is also of interest to note that while the heart records in tracing B above as good beats as it does in tracing C, the faradisation test shows that 'recovery' from the effects of the drug took longer than one would judge to be the case from examination of the beats only.

In the tracings of the next figure (Fig. 4) some of the other remarks already made are illustrated.

Fig. 4 shows a number of tracings. Tracing A shows the limit upto which acetyl-choline can produce inhibition when R/10 was used as perfusing solution. The heart was not treated previously with choline and it was beating on R/10. At the mark AC 10^{-11} the drug of that concentration was perfused in place of only R/10. The slight lowering of the curves is due to the apparatus. In taking off one rubber tubing connection and putting in another after such a disturbance, lowering down of the pointer is seen; but if looked carefully it is seen that the height of the curves is near about the same. This went on till at the mark R/10 Ringer again changed for the drug. This was the 1st dilution which did not show inhibition. 10^{-10}, however, did produce slight.

Tracing E shows some thing when R/5 was used as perfusing solution. Here we see that 10^{-9} is not able to produce any observable inhibition. 10^{-9} however did sometimes show slight inhibition.

Tracing C and D show similar limits when 2 R/5 and R were used respectively as perfusing solution. The limit where the inhibition just is not seen in the case of 2 R/5 is 10^{-8} and in the case of R 10^{-7}.

Tracing B however shows a different thing altogether. We see here at the mark R/10, Ringer of that calcium concentration was perfused and we see that heart is slowly going down-hill till the heights of the curves become very low, then at the arrow mark Acch 10^{-13}, Acetyl-choline of that concentration in R/10 was started as perfusing solution and we see the change. Immediately the stimulation effect is seen. At another mark R/10, R/10 again changed in place of drug solution and again we find the story being

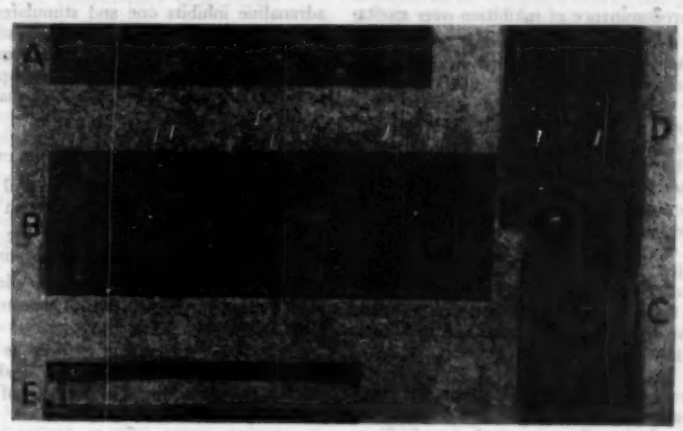

FIG. 4

repeated, *i.e.*, heart slowly but regularly going downhill.

Time-marker in all is marking at half minute intervals.

Fig. 5 shows a group of four tracings. In A at the mark R/10, R/10 was perfused through the heart which was slowly beating. At next mark Atr 10^{-4} atropine sulphate dissolved in R/10 one in 10,000 was perfused for about a minute and then again

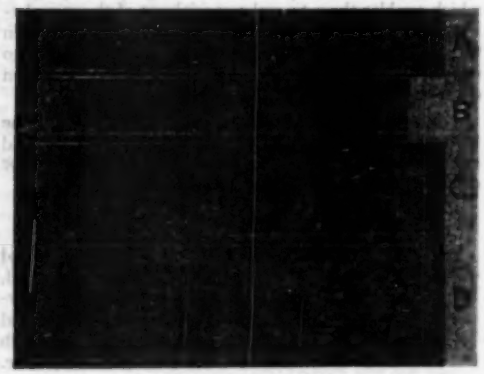

FIG. 5

R/10; such a heart we will call atropinised heart. Such hearts are not inhibited by acetyl-choline, a well known fact, which is seen here as well. But we see something more than that, at the arrow mark Ac 10^{-5}, the drug of that concentration was perfused dissolved in R/10. We find that the heart which was so low gets stimulated again to better activity.

Tracing B shows similar thing. At the arrow mark Ac10^{-6}, that concentration of the drug dissolved in R/10 was perfused and that was started at a time when the heart almost stopped working on R/10. We find evidence of stmulation again till at another mark R/10, the Ringer was started in place of the drug. We see the height of the curves again slowly going downhill.

Tracing C shows similar thing. At mark Acch 10^{-7} the drug of that concentration was started in and we find the height of the curves slowly go up. Tracing D is continuation of C and we started R/10 at the mark R/10 in D in place of Acch 10^{-7} and a steady fall is noticed till the heart comes to a standstill. At the arrow mark Acch 10^{-6} the drug of that concentration was pushed in and at the mark P.V. the drug solution was forced in to wash away the Ringer in heart and we find spontaneous beatings again at the mark Sp.

In all the tracings time-marker is working at half minute intervals.

DISCUSSION

In considering my results I would first point out that if I had used one perfusing solution only, I should have obtained a seemingly much more consistent series of results than those which I have actually obtained. Had I only used solution 2 R/5, for example, I could have declared that acetyl-choline ceased to inhibit hearts below a dilution of 10^{-6}, and that beyond that it was revealed to be an agent which depressed the cardiac beats to a constant level in the manner described by Vernon as that in which alcohol and chloroform do the same. As it is, however, I have the evidence of fact that acetyl-choline can exert inhibition at dilutions much greater than this, and can conceive the possibility that, when blood is the perfusing solution, the sensitiveness of the vagal nerve endings may be even greater than my limit of 10^{-6}. We should not here forget the evidence given elsewhere that Ringer's solution favours a predominance of excitation over inhibition whereas

blood favours a predominance of inhibition over excitation.

So far as they go, my experiments indicate that acetyl-choline enters into some form of chemical combination with the structure, whatever it may be, that mediates inhibition. I deduce that there is a chemical combination from the facts that when the perfusing solution was R/10, the heart did not recover from the effects of 1 per cent acetyl-choline, but did recover if the calcium content of the perfusing solution was increased. There was, in fact, mutual antagonism between calcium and acetyl-choline in respect of the production of inhibition, and mutual antagonism between them in respect of recovery after inhibition had been effected. These facts accord with Burridge's findings that some form of decalcification of the structures concerned in inhibition is one essential of the process of inhibition.

At one time it was believed that strychnine could change the process of inhibition into one of excitation, but that is now in doubt. It seems rather to facilitate the process of excitation. But if we accept current belief that acetyl-choline gives transmission between the ganglionic synapses of the autonomic system and is released at the terminations of cranial autonomic nerves, there should be some explanation of the fact that it is stimulating at one place and inhibitory at the other. So far as my experiments go they indicate that the solution of this problem may lie in the concentrations of the drug released in the two situations, relatively small concentrations would be released at synaptic junctions, and relatively large at the nerve endings. If such were the case then the frog's heart becomes a bad medium for differentiating between them because acetyl-choline would be stimulating to two structures which give a common result. It would stimulate the local cardiac ganglia to produce inhibition while it was stimulating nerve endings to produce the same result. My failure to obtain a cardiac stimulation through acetyl-choline of the same order as that produced by adrenaline may therefore have been partly determined by some such factor as this. At the same time I would point out that acetyl-choline is a more powerful drug than is adrenaline.

Now adrenaline itself is augmentor to some tissues and depressor to others. But also, if it be used in strong enough concentration and the perfusing solution be R/10, its perfusion through the heart and subsequent washing out are followed by effects which resemble those of inhibition and its rebound. Indeed, if one only worked with large amounts of adrenaline and perfused it only in solutions of low calcium content, he would reach the conclusion that adrenaline inhibited hearts. As things have been however, few have worked with hearts under the conditions where it exercises depression.

There are, thus, analogies between the actions of acetyl-choline and adrenaline. Both are predominantly depressor to hearts at high concentrations and both are predominantly stimulating in relatively weak strengths. And just as one looks for differences in the normal make up of the tissues to explain why adrenaline inhibits one and stimulates another, so also one would look for differences in make up between autonomic synapses, and cranial autonomic nerve endings. As judged by my results, the synapses must be able to hold their calcium more firmly than do vagus nerve endings.

Summary and Conclusions

1. Acetyl-choline is a powerful drug and can act at dilutions greater than one part in one billion 10^{-12}.

2. It exerts two actions on the heart of the frog; the one is depressor, the other is stimulating.

3. The depressor action is directly revealed as inhibition or as a reduction of the amplitude beats to a constant level.

4. The stimulating action is revealed as an increase of contraction height, and as a shortened refractory period which permits of the heart being thrown into tetanus.

5. Large amounts of acetyl-choline are predominantly depressor, small amounts are predominantly stimulating.

6. Calcium salts antogonise both actions of acetyl-choline with the result that no definite figures can be advanced in definition of what is large and what is small. It is further seen that the stimulating action of small amounts of acetyl-choline has not been observed when the calcium content of the perfusing solution was 0·01 per cent or more.

7. It is suggested that there must be something special in the make-up of autonomic ganglion synapses which enables them to make special use of the stimulating action of acetyl-choline and something special in the make-up of cranial autonomic nerve endings to enable them to make special use of the depressor action of acetyl-choline.

8. It is further suggested that a difference in the firmness with which the two classes of structures hold their calcium may be a factor in determining the type of action that acetyl-choline can exert.

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INDICATIONS FOR PULMONARY RESECTION*

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Rational treatment of any lesion is dependent upon a correct diagnosis. In no branch of medicine or surgery is diagnosis more accurate than it is in pulmonary diseases. Circumstances permit a variety of investigative means, by proper use of which, a verified diagnosis is possible in practically all instances. A factor of paramount importance is the radiability of the lungs. The air content of the normal pulmonary parenchyma so contrasts with the densities produced by most pathological processes that a roentgenological examination will, in a high proportion of cases, reveal indications of any abnormality that is present. A disconcerting factor, however, is that many pulmonary disease processes have similar appearances by x-ray. Some lesions are quite characteristic but in no instance is a diagnosis verified by this type of investigation. Rœntgenological study simply indicates which lines one should pursue to establish the etiological factor.

Unfortunately the tendency is to accept the presumptive x-ray evidence as final and many times there is failure to corroborate the diagnosis. Some of the greatest difficulties in thoracic medicine and surgery would be overcome if each practitioner was to fulfil his responsibility in this regard and verify the diagnosis.

The basis of any investigation is an accurate, careful history and physical examination of the patient. This tenet is accepted by all but not universally adhered to. Next comes a study of the patient rœntgenologically. Such a study implies more than a single x-ray exposure with the patient in one position. It signifies, or at least should, obtaining the maximum information about the lesion by whatever x-ray methods are indicated. It always includes a careful fluoroscopic survey followed by plates taken with the patient in at least two positions, and it may include many other more detailed procedures as determined by the rœntgenologist. In following cases with established diagnoses a single x-ray film is often quite sufficient but for diagnostic purposes one should refer the patient for a rœntgenological study rather than simply requesting this or that particular film. Admittedly such routines are not always practical, mainly due to the lack of equipment for such studies as tomographs, kymographic observations and the like, but more often due to the financial burden imposed on the patient. These restrictions should not hinder us from appreciating the need and making use of all diagnostic facilities permissible.

Very few internal organs can be inspected and studied from the interior as easily as the lungs. Much information is obtainable by the simple, safe bronchoscopic examination[1] (Betts, 1948). All the major bronchi can be visualized readily and thus abnormalities therein diagnosed just as accurately as those on the surface of the body. Biopsies can be taken, smears for bacteriological and histological studies can be secured. Other bronchi, too small to be within the range of bronchoscopic vision can be outlined by a radio-opaque medium[2] (Betts, 1949).

One of the simplest and yet often overlooked methods of study is the examination of the sputum. This is the most frequent means of confirming the diagnosis of pulmonary tuberculosis. The examination, to be reliable, has to be done by a well-qualified worker and by one who is willing to be persistent. Multiple examinations are often necessary and one should not hesitate to resort to culture methods, or guinea pig inoculations if need be, in a suspected case of tuberculosis. The tendency all too often is to assume a lesion to be tuberculous and give streptomycin or other treatment without ever confirming the diagnosis. This is a grave error as it may markedly influence the life of the individual concerned.

Although bacteriological studies of the sputum are of importance much other information may be readily at hand. The work of Papanicolaou[3] (1942) has stimulated interest in the diagnosis of tumors by examination and study of the exfoliated tumor cells. This procedure is easily applied to pulmonary neoplasms as sputum for such studies is usually available and when it is not one can get a sample by bronchoscopic washing of the suspected bronchus.

There are many other diagnostic means that one may use but even a cursory appraisal of the facilities at hand indicates that a great deal of information can be obtained by these simple methods. The important concept is to realize that a verified diagnosis can be established in a high percentage of pulmonary cases if one accepts no less a stadard than a proved diagnosis.

A few years ago time was thought to be the major element in the healing of any pulmonary process but with the advancement of thoracic surgery and the changing of such lesions as cancer of the lung from the hopeless category to the hopeful, time has now become, as stated by Rienhoff[4] (1942) "the great executioner".

Neoplasms

The year 1933 marked the opening of a new era in the treatment of pulmonary cancer as in that year Graham[5] (1933) successfully removed an entire lung for carcinoma of the bronchus. The patient, a physician, is still living and well. With his demonstration of the feasibility of resection in pulmonary neoplasm the whole outlook changed stimulating interest in the subject and a concentrated effort to detect cases during the early curative period. In countries where accurate statistics are available pulmonary tumors have been found to be a leading cause of death, being second only to cancer of the stomach as the cause of death in men dying of cancer.

Surgery is practically the only successful means of combating pulmonary new growths. X-ray is not effective. Anatomically the lung is a favorable site for eradication of a neoplasm. Being one of the paired

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organs, it can be removed in its entirety along with the accompanying lymph nodes which is the ideal method of surgical treatment for tumors. Pneumonectomy is a much more satisfactory type of "cancer operation" that can be carried out for cancer of the stomach, liver or pancreas.

As is true of all neoplasms, the secret of successful treatment is diagnosis at an early stage before vital structures have been invaded or distant metastases have taken place. Many studies have shown that symptoms appear early in cancer of the lung but unfortunately there is a long delay in arriving at a verified diagnosis. During this interval many cases pass from the operable to the inoperable group. Some of this delay is due to failure of the patient to seek medical aid but much more of it is due to the physician failing to use the diagnostic facilities at hand in determining the diagnosis. Too many patients are labelled chronic bronchitis or chronic pneumonia or treated for tuberculosis until such time as the diagnosis of cancer become obvious. Overholt[6] (1946) has demonstrated that on the average the patient consults the doctor within three months of the onset of symptoms but the physician averages another 9 months in arriving at the diagnosis. If successful surgery is to be done for neoplasms the interval from symptoms to diagnosis must be shortened.

Comparable statistics for this country are not available but the unsatisfactory state of affairs is reflected in that we have had not one resectible case of cancer of the lung in the past one and a half years since starting our clinic.

Bronchiectasis

The most frequent indication for pulmonary resection is bronchiectasis This chronic lesion of the bronchi and bronchioles produces an irreparably damaged segment of lung which cannot be satisfactorily treated by other than excisional means. Symptomatic therapy may be beneficial, especially with the use of the antibiotics both intramuscularly and by nebulization, but it is not curative. Once the changes in the bronchi have become established the process is irreversible. The controversy regarding the etiology of bronchiectasis does not extend to the realm of treatment of the usual case. There is complete agreement that surgical removal is the treatment of choice. Many studies, especially those of Perry and King[7] (1940), Roles and Todds[8] (1933) as well as later ones such as Bradshaw *et al*[9] (1941) leave no doubt but that the prognosis for bronchiectasis without surgical treatment is poor indeed. Few patients developing the lesion in childhood or adolescence live beyond the age of forty. Even many of these years may be passed in an invalid condition.

The early pulmonary resections were largely carried out on bronchiectatic patients as among them could be found a group of young, fairly vigorous individuals who nonetheless had distressing, disagreeable symptoms and were willing to take sizeable risks in the hope of obtaining a cure.

The bronchiectatic patients have also been the stimulus in the development of segmental resection. Bronchiectasis tends to be found in certain bronchial patterns. The most commonly involved sites are the basal segments of the lower lobes (the left slightly more than the right), then the lingular segment of the left upper lobe and the right middle lobe follow in that order. Bronchiectasis may involve any segment of any lobe and quite frequently one lung will be extensively damaged with little or no change contralaterally. Basically, however, it is a disease primarily of the basal segments of the lower lobes, the lingula of the left upper lobe and the right middle lobe.

Many observers, mostly surgeons, have appreciated for ten or fifteen years that although the basal segments of the lower lobes are often bronchiectatic the superior segments of these same lobes are rarely involved. This fact is not of great importance to the patient with unilobar disease but if the lesion is multilobar and especially if it is bilateral, the normal superior segments may be of much importance. If the uninvolved superior segments can be preserved in the case with bilateral lower lobe bronchiectasis the postoperative pulmonary function will be greatly increased. Inasmuch as about 35 per cent to 40 per cent of bronchiectatic patients have bilateral lesions there has been a great incentive to perfect an operative procedure that would remove only the damaged bronchopulmonary segments and preserve the undamaged. Thus bronchiectasis has provided the stimulus for the development of segmental pulmonary resection.

Patients with well-established suppurative bronchiectasis are made miserable by the persistent cough and expectoration and in the more advanced cases may be invalided most of the time. They are also subject to frequent severe upper respiratory infections as well as bouts of bronchopneumonia. As bronchiectasis is an irreversible process with a poor prognosis, when treated expectantly, all symptomatic bronchiectatic patients should be given the benefits of surgical treatment unless some contra-indication exists. The most frequent contra-indication is the extent of the disease. If all the diseased areas cannot be removed without the patient being a respiratory cripple, surgery is better avoided. Extensive bronchiectatic changes are often accompanied by damage to other lung segments by emphysema. An emphysematous lobe is inefficient from the respiratory standpoint and the status of the uninvolved lobes must be assessed in determining operability.

As in all major surgical procedures, the general condition of the patient is of prime importance. The chronological age of the patient is in itself not as noteworthy as the estimated physiological age. In general, bronchiectatic lesions confined to the basal segments of the left lower lobe, either with or without the lingula of the left upper lobe, and lesions of the basal segments of the right lower lobe, with or without the middle lobe constitute good surgical risks. Bilateral lower lobe involvement or extensive involvement of all lobes on one side likewise may be successfully treated surgically. If in addition to the basal segments of the lower lobes one adds the lingula and the right middle lobe the case need not be beyond surgical help as many such have been cured but the risk is increased.

If the superior segments cannot be preserved it is doubtful if trilobar lesions (when bilateral) should be removed. Such individuals may be left with a respiratory reserve that is too low. Thus, in appraising the situation the number of normal segments and the state of their function is more important than the extent of the process in the affected bronchopulmonary segments. Mention should be made also of the fact that some patients with bilateral bronchiectasis will become symptom-free after treatment of the more involved side. By removing one focus the other process sometimes will become quiescent so that an occasional patient with bilateral bronchiectasis may be so improved after the more involved side has been operated upon that he refuses to have the second side treated.

Selecting bronchiectatic patients for surgical treatment can be done only on the basis of complete, adequate bronchographic studies. This is best done in conjunction with bronchoscopic inspection to rule out unsuspected foreign bodies or tumors. It frequently is possible to predict on plain roentgenograms of the chest that certain lobes are bronchiectatic but one can not be certain which lobes or segments are not affected except by complete mapping of the bronchial tree with a radio-opaque medium. It is much more important to ascertain the uninvolved portions than to concentrate on complete filling of the suspected parts. Descriptions of the methods of performing such investigations can be found in the recent literature[2] (Betts, 1949).

Patients with extensive processes or with considerable emphysema in the other lobes should be studied bronchospirometrically to determine the actual oxygen consumption of each lung separately before a decision is reached regarding surgical intervention. It is hoped that facilities and equipment for such studies will soon be available in this country. At present only rough approximations can be made on clinical grounds.

Closely related to bronchiectasis, but still distinct from it in some respects, is cystic disease of the lung. It is frequently associated with bronchiectasis in adjoining bronchopulmonary segments. We believe this condition is a congenital defect due to faulty embryological development. Many times symptoms do not appear until early adult life. This is presumably due to the establishment of infection on the congenital abnormality. The indications for treatment are the same as for cylindrical or saccular bronchiectasis.

Lung Abscess

Many changes in the therapy of pulmonary abscess have taken place in the past fifteen years. Before the advent of modern chemotherapy and antibiotic treatment the mortality for lung abscess was very high under medical management as there was no effective way of stopping the progress of the infection. The benefits of surgical drainage in the late or chronic cases was somewhat better but left much to be desired. The work of Neuhof[10] (1936) and associates as well as others was instrumental in pointing out the improvement that could be attained by early surgical drainage of such abscesses. Although the mortality by such means was markedly reduced one still had to deal with persistent bronchial fistulae, residual bronchiectasis and similar lesions contributing to an increased morbidity.

With the sulfa compounds and penicillin the rate of cure of lung abscess by non-surgical measures has been greatly enhanced. At least 25 per cent to 30 per cent of such cases, when treated early, will be cured by these methods. Most acute lung abscesses should be given the benefit of adequate medical treatment before considering surgical therapy, but there will remain a group of patients who do not respond to these non-surgical measures or who need surgical help because of associated bronchiectatic changes, persistent bronchial fistulae, etc. Medical management of lung abscesses that have been present more than a few weeks is unsatisfactory due to the irreparable lung damage that has already ensued.

Surgical treatment is indicated for those cases which do not respond to adequate non-surgical treatment or who have already incurred irreversible lung damage. The surgical measures applicable are external drainage of the abscess or resection of the segment or lobe involved. Until the past few years open drainage was the safest and accepted treatment for most cases. It has the drawback of prolonged hospitalization and a protracted period postoperatively wherein dressings are necessary, as well as the possibility of a later operation to close a persisting bronchial fistula.

The early resections for lung abscess were accompanied by a rather high mortality although the results in the survivors were excellent as resection adequately deals with the process and residual symptoms are very infrequent. The improvements in technic of pulmonary resection and the added protection of penicillin pre- and post-operatively has lowered the mortality and morbidity to such levels that this method of management is almost replacing external drainage of lung abscesses. There is still the occasional patient with an acute process that cannot be adequately controlled to permit safe resection or an occasional instance of bilateral abscesses where resection cannot be done initially and who require open drainage. Some of these patients may need a resection later to take care of any residual defects in the surrounding pulmonary parenchyma. The trend is definitely towards primary resection in most cases with the open drainage operation becoming less and less prominent. The appeal of a single stage, clean-cut, definitive removal of a disease process is undeniable.

It must be borne in mind that some pulmonary abscesses are due to bronchial obstruction from a neoplasm. When such can be determined bronchos-

copically, or is suspected on clinical grounds, resection is preferable to drainage for obvious reasons.

Of importance also is the modification of pulmonary infectious processes that may be produced by chemotherapy and antibiotics. Some lung abscesses do not excavate, due to poor bronchial drainage, and therefore the diagnosis may not be made by x-ray. This is more frequent when the lesion has been treated by the sulfa drugs or penicillin than was true before these methods were available. Shadows that persist by x-ray after acute pulmonary infections may be due to unexcavated abscesses or neoplams. In either instance removal is indicated.

Tuberculosis

Pulmonary resection in the treatment of tuberculosis is in no way a substitute for the standard procedures, both medical and surgical, used in the treatment of this disease. Excisional therapy is helpful however in certain carefully selected cases for definite well-defined indications. The first resections for tuberculosis were done as "mistakes". That is, the operations were carried out for what was thought to be some other lesion. These "mistakes" did demonstrate feasibility of such treatment so that eventually quite well-defined indications have emerged.

A. *Tuberculoma*—The first tuberculomas were removed because they were thought to be tumors. Even though one can be quite sure a lesion is a tuberculoma its removal should seriously be considered as it has been found that many of the lesions undergo central liquefaction and may open into a bronchus leaving a thick-walled cavity or even worse may spread the infected material throughout other parts of the lungs. As one cannot predict which lesion will cause such complications removal is indicated in the absence of factors prohibiting this type of treatment. Tuberculomas can usually be removed with little sacrifice of lung tissue.

B. *Bronchostenosis*—Mechanical defects have to be treated mechanically. The only effective therapy for bronchostenosis of a major bronchus is removal if the stenosis is of a non-acute, fibrotic type. Collapse procedures are indicated only in the presence of an adequate airway. Bronchoscopic examination of all admissions to various tuberculosis sanatoria has revealed an incidence of 7 per cent to 10 per cent of tuberculous bronchitis of the trachea or major bronchi. As these bronchitic infections run their course, with or without specific therapy, the end result may be a narrowed scarred bronchus with an inadequate airway and improper drainage. The natural sequel is recurrent attacks of fever and malaise due to damming up of secretions distal to the obstruction and subsequent bronchiectasis in the involved lobe or lung. Periodic bronchoscopic dilatations may give temporary relief but are unsatisfactory and not curative. Certain of these cases, in the absence of active tuberculosis in other parts of the lung, respond very well to pulmonary resection.

C. *Thoracoplasty Failure*—Even a well-executed thoracoplasty will occasionally fail to close a cavity and convert the sputum to negative. The factors responsible are numerous, such as the size and location of the cavity, the state of the surrounding pulmonary tissue, the presence of accompanying bronchial changes and occasionally a cavity drainage system that is inefficient and which may in some cases cause an increase in the intra-cavitary pressure. In the absence of contra-indicating factors these cases can have the offending lobe or lung removed. Pulmonary resection is in no sense a substitute for thoracoplasty but it may be useful where an adequately performed thoracoplasty has failed. Also, resection should not be advised if the previous thoracoplasty has not been done properly. In such cases a revisional thoracoplasty is preferable.

D. *Predicted Thoracoplasty Failure*—There are some cases where one can predict with considerable accuracy that a thoracoplasty will not accomplish the desired end. The most common such lesion is the lower lobe cavity which is notoriously difficult to heal by any measure at our command. In the absence of upper lobe disease, and after adequate trials of other measures, resection may be the treatment of choice. There are other occasional lesions such as very large cavities, certain tension cavities and sometimes associated tuberculous bronchiectasis that may lead one to assume that thoracoplasty or other measures will not be effective. Removal of the lesion may properly be done in such instances without necessarily performing a thoracoplasty first.

One other condition should be mentioned and that is resection and pleurectomy in cases with tuberculous empyemata. This condition is a difficult one therapeutically and recent attempts at complete removal of the lung and parietal pleura intact have been encouraging. Sarat and Bailey[11] (1947) have had fair results but it is too soon for a definite opinion of the method. In our series here reported there were only two such cases, both with bad results, although we are not convinced that the results were due to the type of operation or the presence of the tuberculous empyema.

Again it must be emphasized that resection in the treatment of pulmonary tuberculosis is not a substitute for any of the other measures employed but is a supplementary operation for certain definite indications. It must be realised that tuberculosis is not usually a localized disease but is diffuse and always involves more pulmonary tissue than is apparent on physical or roentgenological examination. For this reason it often is found necessary to do a pneumonectomy rather than a lobectomy as inspection and palpation at operation

may reveal more disease in the other lobe or lobes than was anticipated. The greatest risk in resecting tuberculous pulmonary lesions is the reactivation of other foci that were not apparent before operation or were deemed to be arrested and stable.

Miscellaneous Indications—The above enumerated conditions account for most of the pulmonary resections. The other indications are numerous but of very low incidence. Pulmonary or bronchial cysts are embryologically at least part of the lung and may be so included. Almost without exception these structures can be removed without resecting any lung tissue. If they have a bronchial communication and thus become infected, the inflammatory reaction may make lobectomy technically easier than tedious dissection of the cyst itself.

Fistulous communications between the subdivisions of the pulmonary artery and vein forming pulmonary arteriovenous fistulæ have been diagnosed with increasing frequency in recent years. The cyanosis, increased hæmoglobin content of the blood and increased red cell count, a history of repeated, often severe hemoptyses and the demonstration of a localized discrete area in one or more lobes of the lung are quire diagnostic. Angiographic studies will be conclusive. These lesions have often been treated for long periods of time as pulmonary tuberculosis. The severity of the hemoptyses and the risk of cerebral thrombosis from the increased blood viscosity are ample reasons for advising removal. Lobectomy is usually done although a segmental resection is feasible in some instances.

Hydatid disease of the lung is a condition with which we have had limited experience, having resected but three such cases. Good results with resection have been reported by Barrett and others and in our three cases resection has resulted in an apparent cure in each instance.

Results

Statistics in themselves are of little meaning in discussing results of treatment. Each case has to be considered on its own merits and not only the mortality from the disease but morbidity as well considered in appraising the situation. Therefore our results in pulmonary resection are presented only as an indication of what our experience has been and to indicate what may be the prospects for the future. In no sense are our results comparable to reports from the West where conditions are much different. We are simply reporting our experience under the prevailing conditions. For if physicians are not aware of the approximate risks of operation how can they intelligently advise their patients who may need surgical help?

Our Thoracic Surgical Service can be said to have started with the first pulmonary resection on August 7, 1948. From that date to March 15, 1950, we have carried out 51 lobectomies or pneumonectomies for the above mentioned indications. The number of resections for the various types of lesions are too small to have any statistical significance. There have been a total of 11 fatal cases or a mortality of 21·5 per cent of which three were late deaths from 34 days to 8 months after operation. The operative mortality is therefore 16 per cent. These figures are excessive unless one realizes the seriousness of the lesions treated and the mortality that would have ensued without surgical interference. We believe that certain factors have been eliminated that were the cause of difficulty and that the results in the future will be improved.

Undue importance should not be attached to operative mortality rates as one must offer the benefits of surgery to all that may be benefited. Certain poor risk cases must be accepted and it is not conceivable that all such will survive. The greatest asset in any surgeon is the ability to correctly estimate the possibilities of surgical treatment in any individual case. Selecting only the best risks denies to many their only chance of cure. Accepting too many desperate risks unduly delays establishment of a new speciality..

Discussion and Summary

The indications for pulmonary resection have been quite well defined and generally accepted by both the profession and the public in some countries. It remains for us to adopt those standards and methods of selection to our own localities. Much that has been learnt in our countries is directly transferable but certain factors are indigenous and may necessitate modifications.

Tuberculosis, being so prevalent, will form a proportionately greater part of the thoracic surgical work here than is found elsewhere. The emphasis that is being put on resection for this disease must not be allowed to overshadow the more important established methods of treatment. With a comparatively new procedure there is the tendency for enthusiasm to carry that type of treatment too far. Very definite indications for resection of tuberculous lobes or lungs have been set forth and deviation from them must come only after careful consideration.

Bronchiectasis has always been a major field in thoracic surgery due to the rather high incidence of the disease, its distressing symptoms and the almost universally good results that are achieved by surgical excision of the damaged segments. Application of the principle of segmental resection has permitted removal of all diseased parts and preservation of the normal broncho-pulmonary segments. This advance widens the indications for resection and improves the residual pulmonary function. The closely related condition of cystic disease of the lung seems to be more prevalent here than in the West. Indications are that this abnormality is basically congenital in origin but may not become symptomatic until infection supervenes.

Poor dental hygiene is undoubtedly a factor in the high incidence of pulmonary abscess. Although many such cases, if seen during the early stages of the disease, may be cured by appropriate medical measures, the long-standing processes have produced irreversible

lung damage and are best treated surgically. Penicillin and continuous postural drainage frequently will assist many patients to become afebrile and to improve their general condition so that resection can be done instead of the unsatisfactory drainage type of operation. Where possible, resection saves much in morbidity without increasing the mortality. There is still the occasional patient who cannot overcome the acute febrile phase even with all the adjuvant methods and needs to have external drainage but, as a group, the trend is more and more toward a primary resection and away from the drainage type of operation.

Pulmonary neoplasms should constitute a fair percentage of cases on any thoracic surgical service. The shorter life expectancy in India and the lack of adequate diagnostic facilities have combined to make this disease a comparatively rare one as seen in the wards of any hospital. The realization by the medical profession that diagnosis is possible and that a cure is obtainable will stimulate greater interest in this lesion and should result in more cases being diagnosed at an early stage of the disease when curative surgical treatment is possible.

Thoracic surgery is just beginning to get started in various centres in this country. It is only to be expected that difficulties will be encountered but these can be overcome by a realization of the factors involved and a persistent, intelligent attitude on the part of those concerned. The application of the modern type of thoracic surgical aid to those with otherwise incurable or disabling thoracic diseases will be of immense benefit both to the patients involved and the health of the country as a whole. It is incumbent on the medical profession to be fully aware of the possibilities of treatment by such means and to see that the benefits of thoracic surgery are made available to their patients.

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TETANUS—ITS MANAGEMENT

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Tetanus is a fatal disease with severe suffering of the patient. The record of the Campbell Medical College Hospital shows that in 1948, 515 patients suffering from tetanus were admitted of which 287 died with a mortality rate of 56 per cent.

Prophylaxis

Prophylactic injections of tetanus antitoxin administered as soon as possible after a wound has undoubtedly diminished the incidence of tetanus. The Franco-Prussion War, fought before the days of prophylaxis on the same countries as World War I is suitable for comparison. In Franco-Prussian war of 1870-71, Germans had an incidence of tetanus of 3·5 per 1,000 wounded. In World War I the British figure was 1·52 per 1,000 wounded. In 1914 in 4 months before the use of prophylactic sera 163 cases of tetanus occurred amongst the British troops with 200,000 men in the field, whereas in similar 4 months in 1918 with 10 times the men in the field the incidence was 90 cases. The drop in the incidence must have been due to prophylactic use of antitoxic serum. In addition to a marked lowering of the incidence of the disease, the prophylaxis produced a lowering of mortality. In the Franco-Prussian War the mortality was 90 per cent. In the American War of secession the mortality was 89·3 per cent. In 1918-19 the mortality dropped to 31·9 per cent. The above figures show that incidence diminished after the prophylactic use of tetanus antitoxin but still some cases did develop in the passively immunised individuals. Our hospital record corroborates the same fact.

About the dose of prophylactic serum there is good deal of controversy. At first reliance was placed on a single prophylactic injection but reliable experimental evidence showed that immunity derived from a single dose of serum is to a large extent lost at the end of 10 days. Cummius showed that incidence of tetanus was lower after multiple doses. The Tetanus Committee appointed in World War I recommended two injections of 1000 units (I.U.) at an interval of a week. Cummius recommended 4 injections, injections being administered at an interval of a week.

About the dose to be used, in the beginning of World War I the dose used was 1,000 units (I.U.), from 1916 it was raised to 2,000 units (I.U.). Just before armistice 3,000 units (I.U.) dose was started and this dose is now being universally used. It has been definitely shown that incidence and mortality was appreciably lower in the cases with larger doses.

The time of administration of serum after the injury is also important. An analysis of figures in a

series of cases shows that if inoculation was done within 24 hours of the injury the mortality was 63·2 per cent., if after 24 hours, it rose to 76·7 per cent. Another method of immunisation which is not in use in civilian practice but is used as a routine procedure in the army is the method of active immunisation, that is, intramuscular injection of tetanus toxoid. The initial dose is 1 c.c. followed 6 weeks later by 1 c.c. and 6 months later 1 c.c. and later on injection of 1 c.c. once a year. Efficacy of this method is shown by the fact that not a single case of tetanus occurred amongst the actively immunised troops.

Excision of wound is also an important factor in the prevention of tetanus. Dead tissues are a good nidus for the growth of pyogenic organisms which use all available oxygen rendering the wound anaerobic which is necessary for the growth of Cl. tetani.

To summarise—

1. Patient with lacerated wounds should have the wound excised, should have an initial dose of 3,000 units (I.U.) tetanus antitoxin as soon as possible after the injury and the dose should be repeated at an interval of a week. If the wound is infected penicilin should be used.

2. In view of the finding that incidence and mortality were less in those cases who had higher initial dose, some people in this country are thinking in terms of injection of 20,000 units (I.U.) in those cases which came 24 hours after the injury and in those where development of tetanus is likely.

Management of Established Cases

1. To Combat Toxin. To consider the management of an established case it will be worth while considering the pathology of the disease. *Cl. tetani* remain localised at the site of the wound and they produce an exotoxin. Marie, Morax, Meyer Rausom thought that the toxin travel by the intact axis cylinders of the motor nerves and reach the cell station in the central nervous system and produce a condition of hyperexcitability of the cells and thereby of the muscles controlled by those cells. In 1934, J. J. Abel attacked the above view and said that toxins from the site of manufacture are absorbed by the lymphatics, pass on to the general circulation and attack the motor cells in the central nervous system. Barnes and Trueta confirmed this idea by immobilising the limb when the toxin was not absorbed as the lymph flow ceases when the part is immobilised. Abel believes that the toxin also acts directly on the muscle and produces hyperexcitability of the muscles and thus explains local tetanus. The knowledge of this fact is utilised by us in determining the best means of attacking the toxin. Believing in the idea of spread of the toxin by the axis cylinders of the motor nerves and thus attacking the spinal cord intrathecal route was at one time believed to be the best means of treatment. The result was disastrous. As we now know that the toxin circulates in the blood the best method of attack is by the intravenous route with a massive dose as recommended by Cole. We use as a routine procedure, 1 lac (I.U.) units of concentrated serum as an initial dose by intravenous route. We use 5 c.c. ampoules of 20,000 units and 25 c.c. is needed as an initial dose. Subsequently 50,000 units are injected twice a day, half of this amount may be injected by intramuscular route with the idea of slow and continuous absorption and maintenance of constant blood level. Injection had to be continued for 5 to 7 days in those patients who survive, by which time generalised spasm disappear but some stiffness of jaw and back muscles remains for some time longer. Total amount used by us is between 5 to 7 lac units.

Some authorities recommend a single dose of 2 lac units by intravenous route and that no further injections are necessary. They say that antitoxic serum can be found circulating in the blood for 5-7 days after injection and as such it need not be repeated. I confess we did not have the courage to try this method.

Reactions of Antitoxic Serum—In some cases a temporary increase of spasm is found. In rare instances early reactions like pain in the precordium, respiratory distress and late complications in the form of urticaria and arthritis were noticed. They do not give us much anxiety. Sometime it is difficult to inject as a prick with the needle initiates an attack of spasm. In those cases Myanesin may be of help.

Penicillin—It is said *Cl. tetani* are sensitive to penicillin *in vitro* but in actual practice no appreciable change in rate of mortality is noticed after use of penicillin. It is, however, of value in cases with infected wound.

Anatoxin—Kuntzet treated some patients with anatoxin. He is of opinion that it is superior to antitoxic serum. We have no experience with this.

Vitamin C—Vitamin C inactivates the toxin of *Cl. tetani in vitro*, and in animal experiment it has been shown that it increases the power of resistance of the animal to the toxin.

2. To Treat the Wound—Various types of wound were noted as nail prick, lacerated infected wound, wound caused by quinine injection and abortion. Otorrhoea accounted for 70 per cent of cases in children. Fair number of patients came in without any history and sign of injury. Wherever possible the site of wound should be tackled 3 hours after the injection of antitoxin. The idea is to bring oxygen in contact with the wound so that *Cl. tetani* which are anaerobic will have an unfavourable site for production of toxin. Penetrating wound is laid open. In lacerated infected wounds the dead tissues are removed, crevices, if any, are laid open, wound is flushed with hydrogen peroxide and dressed with cream of 40 per cent oxygen powder 4-hourly and covered with porous gauze.

Local infiltration with antitoxin may be done with advantage prior to tackling of the wound.

The limb should be splinted.

3. To Control the Spasm. Muscles are in constant increased tonus on which at frequent intervals temporary exacerbation occurs. Mind is absolutely clear so agony is all the more felt. It is a pitable sight to see these patients. Any stimulus initiates a spasm as flash of light, blast of air, any noise, pricks, touching. Spasms exhaust the patients and some even die during an attack of spasm.

To give comfort to the patient by allaying the agony of the spasm is the prime consideration in the mind of the attending medical man. How best can it be achieved?

1. They should be nursed in a place wherefrom any source of external stimulus can be excluded. The ideal place is an underground cell.

2. Drugs. Various drugs have been suggested bromides, chloral hydrate, avertin, paraladehyde, morphine, barbiturate group of drugs, curare, mag. sulph., acetyl choline, Myanesin. Perhaps not one drug is the answer in all cases; a combination of a number of drugs is suitable for a case. We shall discuss in brief the merits and demerits of some of these and our experience with them.

Paraldehyde—This drug is used by us as a routine. Route of administration is rectal, in dosage of 2-3 drams on average for an adult, depending on the severity of the disease and constitution of the individual. Paraldehyde is diluted in 4 times of normal saline or oil olive. The dose has to be repeated in 6 hours' time, sometimes earlier depending on the spasm. In those cases where rectal paraldehyde is rejected, due to an attack of spasm, it can be injected into the muscle usual dose is 10 c.c. and it may be repeated as necessary. No sterilisation of paraldehyde is necessary. Some cases have been found to be resistant to paraldehyde after administration of a number of times. In those cases barbiturates like dial, gardenal sodium are used.

During the excretion of paraldehyde through the lungs it irritates the alveoli and bronchi and causes alveolitis and bronchitis.

Magnesium Sulphate—25 per cent 5 c.c. to 10 c.c. intravenous twice a day is used as a routine procedure. We believe it is of advantage.

Avertin—Cole advocated the use of avertin, dose being 1 gram per Kgm. of body wt. by rectal route. The dose to be repeated as necessary. We have not used avertin. Kuntzen however found degeneration and deposition of fat in parenchymatous organs after its repeated use.

Curare—It is a drug which relaxes muscles. It is available in the market as Tuberine, Intocostrine. It is used at the rate of 1530 mgs. per hour. Relaxation is of short duration and fleeting, lasting for 20-30 minutes. Complication is respiratory depression. It is not a commendable drug.

Myanesin which is [$\alpha : \beta$ dihydroxy γ-(2 methyl phenoxy)-propane], is talked of now-a-days. It is given intravenously, the dose being 10 to 20 c.c. In children it is given intramuscularly, the dose being $\frac{\text{age}}{2} + 1$ c.c. The injections are repeated at 3 to 4 hours interval. The effect on the muscle relaxation is immediate and complete but lasts for a short period varying from 12 min. to 1 hr. In some cases spinal and abdominal muscles do not relax satisfactorily. Some times haemoglobinuria and marked cardiovascular depression with fall of blood pressure are noticed. On the whole the drug is of value in combination with others.

Morphine—We never use it here.

Acetyl Choline—Switzer and Wright found that in the presence of intact vagus it inhibits the anterior horn cells throughout the spinal cord. It controls spasms in strychnine poisoning. It slows respiratory rate without producing cyanosis, slows pulse rate, volume tension remaining good. Some relaxation of the muscles are noted which lasts for sometime. This may be of value in combination with other drugs and in convalescent stage when stiffness is persisting for a long time.

4. To Maintain Nutrition. It has been noticed that patients have great thirst and appetite. They shout for water. Most of them can drink with difficulty. Great patience is needed on the part of the nurse to feed the patients. In the beginning diet in liquid form is administered, egg flip, milk, fruit juice and sugar aiming at 2000 calories in 24 hours. As soon as possible solid diet should be started. It is difficult to maintain nutrition on liquid diet.

Some patients cannot swallow. In them nasal catheter has to be resorted to. Sometimes passing of a catheter initiates spasm. In these cases some antispasmodic drug has to be used beforehand.

Complications

Hyperpyrexia—Some patients develop high temperature. This is considered to be a terminal event. Treatment adopted were tepid sponging, ice bath, ice enema.

Respiratory Complications—Œdema of the lungs, bronchitis have been noted. Oxygen is used as a routine from the beginning.

Perspiration is noted in some cases. It is a bad omen, atropine is used. Bowel and bladder have to be attended to by enema and catheter as necessity arises.

Acknowledgment

I wish to thank Dr. A. K. Datta Gupta, Principal Campbell Medical College, for having allowed me to utilise the hospital figures.

LABOUR IN OCCIPITOPOSTERIOR POSITION AND ITS MANAGEMENT

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In vertex presentation occipito-posterior occupies about 25 per cent of cases (R.O.P. more than 15 per cent and L.O.P. less than 10 per cent). In occipito-posterior position head is deflexed due to apposition of the vertebral column of the foetus with that of the mother, the back of the fœtus straightens, therefore the head of the fœtus becomes deflexed. But in 90 per cent of the cases during the 1st and 2nd stage of the labour (if the uterine contraction be good and there is no disproportion between the fœtal head and the pelvis), the head is flexed, the occiput becoming the lowermost in the pelvis and hence rotates anteriorly. Therefore normal delivery takes place. But in the remainder 10 per cent of cases the head remains in the deflexed attitude, therefore there is either non-rotation of the head (head lying in the oblique diameter) or head remains in the tranverse diameter or occiput rotates posteriorly in the sacral hollow. In the deflexed attitude the diameter of engagement is occipito-frontal, 4¼" (area occupied is about 13½ sq. inches) instead of sub-occipito-bregmatic, 3¾", or occipito-bregmatic, 4". (The area occupied by sub-occipito-bregmatic is about 11½ sq. in. or occipito-bregmatic 12 sq. in.). Therefore the delivery becomes abnormal and difficult. In a posterior position extension of the deflexed head may be increased during labour owing to the widest part of the head lying behind the oblique diameter of the brim where the space is limited, whereas the narrow sinciput lies in the widest diameter of the pelvis where it can descend easily. Another important cause is weak uterine contraction. Due to normal uterine contraction head meets resistance in the pelvic floor, hence the head is flexed, the occiput becomes the lowermost. Therefore anterior rotation takes place. In certain cases the membrane raptures prematurely. Therefore liquor amnii is drained. The body of the foetus can not rotate easily as it encounters resistance with the uterine wall. Thereby the rotation of the head is prevented. There may be slight disproportion between the head and the pelvis.

Diagnosis

Palpation. Umbilical grip.—The too many small parts are felt on both sides of the abdomen. On the other side small portion of the back is felt. The anterior shoulder may be felt in the side of the back away from the middle line.

Pelvic grip—Wide sinciputal end may be felt easily (this gives an idea about the flexion of head). In some cases the head is not engaged in primigravida even during the 1st stage of labour.

F.H.S.—Foetal heart sounds are heard prominently as the chest of the foetus apposes with the uterine wall due to extension of the vertebral column of foetus. *Internal Examination.* In the first stage, head is high up generally. Therefore, the head can not be felt easily. The shape of the forewater is not so convex as in the anterior position. Sometime membrane ruptures early, therefore internal examination should be done gently not to examine the case during contraction (pain) as there is every chance of rupturing the membrane.

During the second stage—Anterior fontanelle can be easily felt near the symphysis pubis. If the anterior fontanelle is lying more anteriorly (behind the symphysis pubis) then the head is less deflexed. Prognosis is good in these cases if the uterine contraction is strong and there is no disproportion between the foetal head and the pelvis. The more deficient the flexion of the head the lower and posterior is the anterior fontanelle (which can be felt easily. It is not so near the symphysis pubis).

General Course of Labour

Generally the course of labour is delayed but in some cases the delivery takes place normally within normal time. In a certain percentage of cases the membrane ruptures prematurely. Delivery is prolonged gradually, the uterine contraction becomes feeble. The head remains in the oblique diameter or in the transverse diameter or rotates posteriorly. If the head is small in proportion to the pelvis and the uterine contraction good, the head is delivered with the occiput in the sacral hollow specially in multipara. The vertex passes out beneath the symphysis pubis, then the perineum stretches, the occiput slips over it. Finally the face passes under the symphysis pubis. The delivery of head is completed by a movement of extension. In such cases there is every possibility of perineal tear, therefore bilateral episiotomy should be done specially in primigravida.

Prognosis

Prognosis is bad—

1. When the head is floating in the first or beginning of the second stage of labour in the primigravida and when the head is floating in the second stage in the multipara.
2. In primigravida—specially elderly (about 30).
3. When the membrane ruptures early.
4. When the uterine contraction is feeble (primary or secondary uterine inertia).
5. When the measurement of the pelvis is in the border line.
6. When the head is big *e.g.,* in the case of postmaturity.
7. When the anterior fontanelle can easily be felt—due to its position posteriorly *i.e.,* away from symphysis pubis.
8. When there is either signs and symptom of maternal or foetal distress.

Prognosis is favourable in—

1. Multipara with a history of previous normal labour.

2. When the membrane ruptures with complete dilatation of cervix.

3. When the uterine contraction is strong.

4. When the pelvis is capacious.

5. When the head is small e.g. premature foetus.

6. When the anterior fontanelle can be felt with difficulty by pushing the finger anteriorly towards the symphysis pubic *i.e.*, head is in a position of less deflection or when the posterior fontanelle is felt easily posteriorly.

7. When the condition of the mother and the child is good. Pelvic measurement should be done (brim and outlet, both). If possible X-ray examination be done. Diagonal conjugate should be measured. Munro-Kerr's method should be tried.

Management

Before Labour—

Buist Pad: Thick pad longitudually covers the abdomen towards the side of back with a postural treatment, to increase uterine obliquity:—

In R.O.P. to be on the left side.

In L.O.P. to be on the right side.

The thick pad sometime helps. (But in 90 per cent of cases the occiput rotates anteriorly without any help and therefore it is very difficult to assess its utility).

First Stage of Labour—Movement should not be allowed. Sedatives—Choral hydrate, bromide, morphine and atropine, pethidrine hydrochlor. Glucose and fruit juice.

The internal examination should be done gently, not during contraction as there is every possibility of rupturing the membrane. After rupture of the membrane, internal examination should be done to verify the following conditions:—

1. Condition of the cervix.

2. The position of the head—whether in the mid-cavity or lower down.

3. The position of the fontanelle anterior and posterior.

F.H.S.—Foetal heart sound should be counted and located.

Since nine out of ten cases are delivered normally with forward rotation of the head little need be done until it becomes evident during the second stage that the occiput is not coming forward in the cases with normal pelvic measurement or where there is no appreciable disproportion between the foetal head and pelvis.

The causes which prevent forward rotation of the occiput are:—

1. Weak uterine contraction. 2. Laxity of pelvic floor due to old lacerations in multiparæ. 3. A large sized baby. 4. Cord round the neck. 5. Distended bladder. 6. Loaded rectum. 7. Hand lying by the side of the head.

Second Stage of Labour.—When the second stage has lasted for 3 hours in primigravida or 2 hours in multipara without any sign of anterior rotation of the occiput, manual rotation should be done very gently under anæsthesia.

The whole hand is passed in the vagina to ascertain the position of occiput. Then the head is flexed by pushing the forehead steadily upwards during the pain or the palm should grasp the occiput and try to flex the head during pain. The pressure should be maintained during the interval by the assistant by counter-pressure over the breech. Fully supinated right hand is used in L.O.P. and left hand in R.O.P. Then the head is rotated by the process of pronation of the hand. If possible the assistant should push the anterior shoulder gently towards the middle line. Then the forceps are applied.

2. Rotation of the head with forceps (Scanzonis manœuvre then the forceps should be taken out and re-applied. This is now seldom used due to its dangers to the mother. Must not be used by the inexperienced.

3. Kiellands forceps—Rotation by the Kiellands forceps and then traction by the same in the same sitting.

4. Version and extraction—Not so much used now. But sometimes used in multipara with the history of previous normal delivery specially when the cord is prolapsed. Used in flat pelvis.

5. Caesarean Section—In case of disproportion or very elderly primigravida, age more than 35, when the head is floating in the first stage of labour.

6. When the occiput has rotated posteriorly and the head is in the pelvic cavity or in the outlet forceps should be used in that position after bilateral episiotomy in primigravida.

7. When the child is dead—craniotomy should be done.

In occipito-posterior position first and second stage is generally prolonged and the following complications may occur—

1. Early rupture of membrane before complete dilatation of cervix.

Treatment—

(*a*) Rest in bed with foot end of the bed raised. With Buist pad and binder above the fundus.

(*b*) Sedatives—Chloral hydrate and bromide sometime morphine and atropine.

F.H.S. should be located and counted.

2. Dry and difficult labour due to excessive drainage of liquor amnii.

Treatment—Rest in bed, sedatives.

F.H.S.—Should be counted. If dilatation of cervix is complete—forceps should be applied gently under complete anæsthesia. If foetus is dead—craniotomy. Manual rotation should not be tried in these cases.

3. Prolapse of cord—Rest in bed with foot-end of the bed raised (Trendelenberg's position). Reposition of cord. After full dilatation of cervix, manual

rotation of head and application of forceps. In multipara with the history of previous safe full term delivery—version and extraction if the cervix is not fully dilated.

4. Secondary uterine inertia—Rest and sedatives. Glucose and fruit juice.

5. Asphyxia Neonatorum—Every arrangement should be ready for the treatment.

6. Perineal tear—Episiotomy should be done in primigravida.

7. P.P.H.—Everything must be ready to combat this.

8. Puerperal sepsis—Due to delayed labour, (*b*) Repeated vaginal examinations, (*c*) Instrumentation, (*d*) Injury to the local part, (*e*) Divitalised conditions of the mother due to delayed and difficult delivery. As far as possible all aseptic precaution should be taken. Prophylactic treatment by sulpha group of drugs and penicillin if there is any temperature.

9. In some cases labour may be obstructed, contraction ring may be felt, uterus may rupture.

10. Foetal death rate is higher than in anterior position.

Analysis of Clinical Experience of a Few Cases of Delayed Labour

After internal examination the head was low down and occiput was felt posteriorly in the oblique diameter. When the head was pushed up and flexed in some case the head automatically rotated anteriorly like magic which was felt by the fingers in the vaginal canal. Afterwards the deliveries were normal.

It is very difficult to give a correct statistics of occipitoposterior position from In-door Hospital record as the cases are generally admitted in the first stage or sometimes in the second stage of labour. Therefore in certain cases the head has already rotated anteriorly before examination.

The following is the record from the Chittaranjan Hospital, Calcutta:—

Vertex	*Breech*	*Face*	*Compound*	*Twin*	*Total*
401	9	2	2	4	418

i.e., vertex presentation in 96 per cent of cases.

Occipito-anterior	*Occipitoposterior*	*Total*
374	27	401

i.e., occipitoposterior in 6·75 per cent only.

Out of 27 occipitoposterior there was normal delivery in 18 cases, delivery by manual rotation and forceps—7 cases. In only 2 cases forceps were used in posterior position *i.e.*, in 2·25 per cent of vertex presentation forceps were required in occipito posterior cases.

Summary

Occipitoposterior position is one of the commonest causes of dystocia, common in primigravida, more so in elderly primigravida. In this country when the patient is admitted in the hospital or the obstetrician is called in generally the head is fixed either in the oblique diameter (P.O.P.) in the sacral hollow or in some cases in the transverse diameter (deep transverse arrest). In some cases there are signs and symptoms of maternal and foetal distress, the membrane has ruptured long before. In that condition manual rotation of head is difficult and dangerous. But there is no other alternative than to try this. Therefore under anaesthesia manual rotation should be tried gently after flexing the head. Then forceps should be applied in the same sitting. If manual rotation fails the only alternative left is application of forceps in that position. But even in some delayed cases when under anaesthesia manual rotation is attempted the occiput rotates easily. In primigravida bilateral episiotomy should be done. If the patient cannot be delivered by forceps craniotomy should be done specially when the condition of the mother is bad.

In early cases—External pelvic measurement both inlet and outlet should be taken when head is floating. Modified Munro-Kerr method should be done. If available X-ray examination of pelvis is helpful. If there is marked disproportion or the mother is a primigravida, above 35, Caesarian section should be done (if possible). The obstetrician must be sure that it is not a brow presentation.

In occiput posterior cases—(*a*) Rest and sedatives in the first stage, glucose and fruit juice. (*b*) As far as possible strict aseptic precaution should be taken. (*c*) Arrangement for the control of post-partum hæmorrhage must be ready. (*d*) Every arrangement for treating asphyxia on the nowborn should be ready. (*e*) For suturing the perineum arrangement should be made beforehand.

As a prophylactic measure—Sulpha group of drugs should be started after delivery. Penicillin may be given with it.

SENILE ENLARGEMENT OF PROSTATE —PATHOLOGICAL ASPECT*

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Before I proceed to describe the pathological aspect I shall in short go over the broad anatomical and etiological considerations. The word prostate has originated from the Greek word 'prostates' *i.e.* one standing before, and this organ stands before the bladder. The organ lies within the pelvis with its apex directed downwards and the base upwards. The upper surface with base of the prostate is directed upwards against the inferior aspect of the bladder in the neighbourhood of its urethral opening. The urethra enters the prostate at a point near the middle of its upper surface or base and leaves it at a point situated

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on its anterior border just above and in front of the apex, describing a curve with its concavity forward. The ejaculatory ducts enter the glands posteriorly and open into the prostatic portion of the urethra. The organ has got one middle lobe and two lateral lobes. The normal histology of the organ reveals that. It is a conglomerate of 30 to 50 small compounded tubuloalveolar glands; they give origin to sixteen to thirty-two excretory ducts which open independently into the urethra on the right and left side of the coliculus seminalis. Nextly, the interstitial tissue; this is very abundant and sometimes forms more than half of the organ. This interstitial tissue consists of connective tissue with smooth muscles arranged in strands. This in short is the anatomy of the organ.

Nextly, the question of etiological factors responsible for this enlargement. In the beginning the workers looked for predisposing and exciting factors in gout, syphilis, horse back riding, alcoholism, sedentary habits, constipation, gonorrhœa, strictures and stone. Later histological studies showed the condition to be a myoma, adenomyomatous or adenomatous in nature. Some people thought this to be a tumour; but this could not be accepted as when true adenoma occurs it produces a different picture because in this senile hypertrophy the change starts as multiple foci and is self-limited. Again inflammation was brought in as an etiological factor. But there was difficulty in accepting this as the sole cause. Although changes found in the true inflammation has got great similarity with this condition, the past workers hold that this factor cannot be taken as the primary and sole factor. Nextly, the question of relationship between the endocrine glands and prostate hypertrophy; this question still awaits solution. The association of this condition invariably with the elderly persons suggested strongly the relationship with testicular hormone similar to the cystic hypertrophy of the breast in the female. In experimental animals synthetic testicular hormone inhibits prostatic hypertrophy which is produced by pituitary hormone but treatment with this agent has not been very successful in enlarged prostates.

Now I come to the pathological changes that we find in senile hypertrophy of the prostate. The organ becomes enlarged, one such organ weighed 228 gms. This may be either due to glandular or interstitial hypertrophy or to both. If the glandular element predominates the consistency is soft while if the interstitial increase takes place, the organ feels hard. Usually a number of spongy nodules are found which can be seen clearly on a cut surface. These nodules enlarge so as to form a mass which compresses the surrounding tissue and this in turn constitutes a false capsule which enables the nodular fibrosis rather than nodular hyperplasia and in these cases shelling out is not possible. The lateral lobes may be enlarged or a middle lobe may be formed by the hypertrophy of the group of glands which lies on the floor of the urethra. This conical mass of the middle lobe projects up from the floor of the bladder, carries the urethral orifice with it. This is in short the changes that we find in senile enlargement of the prostate.

Going through our records from biopsy we find that in the last twenty years we have recorded 74 such cases. It is a most paltry figure specially when we remember the American figures which I am sure would have produced 7400 cases in any discussion meetings. The analysis of these 74 cases show the following.

Age incidence—

Age	*No. of cases*
Below 50	8 (10·8 per cent)
50 to 59	28 (37·8 per cent)
50 to 69	26 (35·2 per cent)
70 to 79	7 (9·4 per cent)
80 to 89	2 (2·7 per cent)
Not known	3
Total	74

Highest age	87
Lowest age	35

Histological picture—

Pure fibrosis	8
Pure glandular hypertrophy	23
Both fibrosis & glandular proliferation	40
Cystic dilatations of the glands	8
Inflammation	7

Incidence according to race—

European	15
Indian	48
Chinese	1
Not known	10

Thus being the position, what effects we expect from such morbid anatomical and histological changes? The effects are mainly felt in the urethra, the bladder and the kidney.

The prostatic urethra may be elongated, compressed to a mere slit and become tortuous. This is the most important cause of obstruction. The bladder cannot completely be emptied because the urinary outlet is lifted up above the surrounding floor and the enlarged middle lobe may produce ball-valve action. The vesical sphincter is rendered incomplete being stretched by the middle lobe which grows up from the floor of the urethra. This causes a constant dribbling of urine and yet the bladder is never empty. This predisposes infection with resultant cystitis. The bladder becomes hypertrophied in its attempt to get over the obstruction. This condition later on gives rise to dilatation, pouching of the walls and false diverticula. Due to the stagnated urine phosphate calculi may be formed. The kidneys are affected because of effects of obstruction and infection. Hydronephrosis may result; Infection may spread above producing pyelonephritis and pyonephrosis.

Renal insufficiency results in retention of non-protein nitrogen and uremia may set in. In some cases glandular hypertrophy may lead to carcinoma.

SPECIAL ARTICLE

OCCUPATIONAL HAZARDS IN COAL GAS MANUFACTURE AND DISTRIBUTION*

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This paper presents a study of the coal gas industry from the view-point of an industrial hygienist, potential health hazards incident to the manufacturing and the distribution processes and of some practical measures of control.

Use of coal gas is gradually becoming very popular in India both for domestic and industrial purposes. Bombay and Calcutta cities provide coal gas for domestic consumption. In Calcutta alone in 1947 about 6,000 houses were using gas for cooking, heating water and refrigeration. The total daily consumption of gas more or less is 3 million cubic feet both for domestic and industrial use in Calcutta alone.

Process of Manufacture

Coal from Bengal and Bihar coal fields with high percentage of volatile matter is selected for gas manufacture. Bituminous type of coal is preferred in the manufacture of coal gas, for it contains greater amount of volatile matter than any other type of coal.

Table I—Showing Typical Results of Analysis of Selected Samples of Bituminous Coal

Name of the Mine	*Moisture %*	*Volatile Matter*	*Dry Residue % Ash*	*Fixed Carbon*
Methani	1·6	34·3	12·4	53·3
Bejdih	1·4	33·9	13·1	53·0
Parbelia	1·4	34·7	13·6	51·7
Poidih	1·7	34·1	12·5	53·4
Seetalpur	1·4	33·5	12·0	54·5
Banksimulla	2·7	35·3	10·8	53·9
Sodepur	1·5	34·1	13·1	52·8

The main process in the manufacture is to distil at a very high temperature (about 1000°C) in the absence of air, *i.e.*, oxygen. The coal gas thus formed has got roughly the following composition:—

Hydrogen	28%
Nitrogen	28%
Methane	25%
Carbon monoxide	9%
Carbon dioxide	5%
Unsaturated hydrocarbon	3%
Oxygen	2%

The flow sheet of the coal gas industry is diagrammatically represented in a figure.

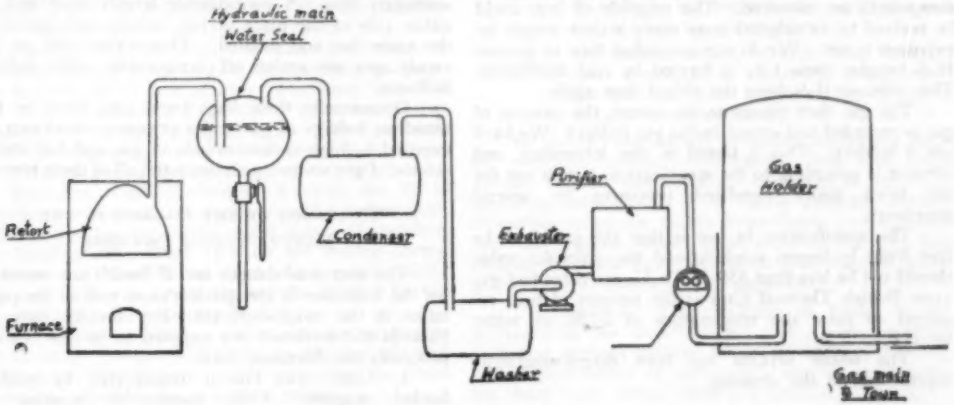

Diagram of Coal Gas Plant

Big lumps of coal are crushed down into smaller pieces by a machine—"Coal Crusher". The crushed coal is carried to the top of the bunker by an elevator. From there a machine—"Stroking Machine" receives some measured amount of coal for charging the retorts. In addition to charging the retorts by centrifugal force with coal, this stroking machine also discharges the coke, the residual fully carbonised coal with the volatile matters given off. The red hot coke is discharged partly into the furnace itself for heating and for generating the producer gas, and the rest into the coke trolly where it is quenched with water and carried to the coke yard.

Now the retorts are heated. The process of heating is done directly by producer gas.

The producer gas is generated by the action of air and water on red hot coke.

$$C + H_2O = CO + H_2 \quad \begin{cases} C + O_2 = CO_2 \\ CO_2 + C = 2CO \end{cases}$$

The flames of the producer gas are sufficiently large so as to envelope the whole sets of retorts and heat them uniformly.

There are 35 sets of retorts, each set containing eight D-shaped retorts each of ½ ton capacity made of fire clay or silica. These eight are arranged hori-

* Industrial Health in India, Series IX. A Seminar paper during the special course in Industrial Hygiene.

zontally one upon another four on each side of the combustion chamber.

The coal retorts is heated in the absence of air. When the temperature rises to about 1000°C the coal gives out gases containing volatile substances. The gases pass at high level through the ascension pipe into the hydraulic main. The volatile substances condensed *en route* are trapped into a tar well and a tank of ammoniacal liquor. The tar is recovered but the liquor though of value is led to waste.

The gases now pass through iron pipes into the scrubbers (washers), which are of three types:—

(*i*) Liversey, (*ii*) P.A., (*iii*) Rotary.

All the three are closed processes. In all the types water is the main factor which helps in extracting the impurities of the gas. The same process is repeated through another set of similar washers. Then the gas is passed through a third scrubber, the oil scrubber containing light diesel oil. Napthalene and benzene are principally removed in this process.

The gas also contains sulphur compound which evolves the injurious sulphur dioxide when the gas will burn. These are removed by passing the gas through purifying box, containing hydrated ferric oxide. As the gas enters the purifier sulphur reacts with ferric oxide to produce ferric sulphide and water. Also ferrous sulphide is formed. Thus all the sulphur compounds are removed. The sulphide of iron could be revived to its original state many a time simply by exposure to air. We do not use slaked lime to remove H_2S because some CS_2 is formed by coal distillation. This releases H_2S from the slaked lime again.

The gas then passes to the meter, the amount of gas is recorded and stored in the gas holders. We have got 3 holders. This is tested in the laboratory and when it is according to the specification, is sent out for the town under regulated pressures by several governors.

The specification in use is that the gas must be free from hydrogen sulphide and the calorific value should not be less than 450 B. Th. U. per cubic feet gas (one British Thermal Unit is the amount of heat required to raise the temperature of 1 lb. of water by 1°F.).

The whole process has been diagrammatically represented in the drawing.

Distribution

From the gas holder main pipes go out in the streets (underground) by branching and sub-branching to supply the street lights, factories and domestic lines. Naturally there are many joints and chances of leakage. It is not much harmful in the street but very dangerous when there is leak in a closed room. Fortunately, we can smell gas when there is slight leak and immediate attention may be paid for its rectification. The first case in my eight years service in the gas company, is where a three-storied building was severely damaged by gas explosion due to small leakage from a service pipe of a street lamp. The house was built on arches and consequently there was enough hollow space under the floor. The gas pipe for the lamp was just adjacent to the wall of the house. People of the locality smelled gas but could not find out the point of leakage. The leakage continued for a few days. One day somebody lighted a cigarette and threw the burning match-stick near the house. In a moment the floor was blown off and there was terrible damage to this house and the other house just in front of it. Luckily no fatal case occurred but 3 persons got traumatic injuries. In another case where a mistry went to attend a leak in a house got burnt by gas explosion. The room was closed, without opening the door and windows he lighted a match-stick. Immediately there was an explosion and he got burns mostly in the face. Explosion like the above are likely to occur when the gas gets diluted with air in the ratio of 1:5 in the presence of a source of ignition like a lighted match or an electric spark.

Frequently small explosions happen as when lighting a geyser. Usually the gas cock is opened first and the gas accumulates in the cylinder of the geyser with air while the match is beng struck and explodes when lighted. These can be avoided by following proper instructions as to the use of these appliances.

The main pipes sometimes require to be changed for alteration or repair without stopping the gas supply of the town. In such cases the gas is byepassed to a secondary line. A considerable length away and on either side of the place of job balloons are passed in the main line and inflated. Thus either side of the repair spot are sealed off temporarily with inflated balloons.

Occasionally these bags burst and there is tremendous leakage of gas under pressure—workmen are exposed to high concentrations of gas and fall unconscious. I got several such cases and all of them revived.

Discussion of the Hazards in the Manufacturing Processes

The source of danger and ill health are numerous for the workmen in the gas works as well as the population in the neighbourhood. For brevity only the hazards the workmen are exposed to in the various processes are discussed here.

I. Coal: (*a*) This is transported by pushing loaded wagons. Only mechanical injuries are encountered.

(*b*) Coal heaped in the yard takes up a good deal of oxygen and becomes heated giving off CO and water. Coal may catch fire from spontaneous combustion, especially in a closed space or when it is in small pieces and if dry or rich in pyrites. But it is only a theoretical possibility. The sulphur content of gas coal we consume is very low and moreover we stack the coal in the open yard, for a short period only and the turnover is large—our daily consumption is of the order of 200 tons.

(*c*) Dust: Coal dust is not much injurious. Watkins Pitford (1927) has shown that in pneumoconiosis caused by soot or coal dust the lungs are very black but are free from sclerosis. Recent researches

have shown however that the lung resistance is lowered due to lymphatic damage. The problem, however is complicated.

II. Furnace: Keeping up the temperature in the furnace is an exhausting job. The worker breathes much coal dust and is constantly exposed to the action of great heat from the walls of the furnace and each time the door is opened to throw in coke or to stir the msas or break up hard surface formed by slag. It is on these later occasions that burns are liable to occur with some frequency. Producer gas used in the furnace is very poisonous due to its high concentration of carbon monoxide, but there is no chance of its escape in our plant, as the producer gas completely burnt down in the combustion chamber. The approximate composition of the gas is as follows:—

N_2	.. .. ..	61% by Vol.
CO	.. .. ..	31% „
H_2	.. .. ..	4% „
CO_2	.. .. ..	4% „

III. Retorts: Cleaning the incrustation, augering the pipes, repairing the retorts, raking the clinkers are very strenuous jobs. The workman is to work before a high radiant heat. To counteract the heat exhaustion and other heat effects invariably found in such operations, liberal use of common salt either as salt tablets or very dilute saline drinks is recommended. The very young and the very old should not be allowed to work here. Our experience shows that the absenteeism is minimum in the age group of 25-35.

Osborne *et al* (1922) have also shown that frequency rate of accident is lowest when the operating temperature is about 67°F. and sharply rises when it moves over 72°F. or below 62°F. So it is quite natural that accidents are not very infrequent here. More mechanisation for removing the coke will certainly minimise the accidents during the discharge of the retorts.

Moreover, while discharging a retort, the lid is opened, there is usually an explosion and a sudden gush of flames and hot tar, which might injure the worker. The burning coke which falls on the trolley during discharge gives out a dense cloud of hot gases; chiefly CO_2 and tarry vapour which may be inhaled by the coke and ash-coolies working on it.

IV. Drains: Waste water contains ammonia and its salts, Prussian blue, ferrocyanide, tar oils and naphthalene. So while a worker goes into the drain to clean he should wear protective masks.

V. Carbon Monoxide poisoning and its control: The action of carbon monoxide in the body is related to its affinity to combine with hæmoglobin, which is 300 times more than that of oxygen. The degree of anoxemia therefore depends on HbCO present in the blood. Blood saturation upto 15% HbCO rarely produces any symptoms but when blood saturation goes up to 20% HbCO, tightness across the forehead, possibly slight headache and dilatation of cutaneous blood vessels are observed. When HbCO is 70% or over, death occurs. On exposure to high concentrations the victim may notice few, if any symptoms, yet he may without warning become unconscious and die without regaining consciousness. Hemrich (1944) has shown that polycythemia, a typical reaction to low oxygen saturation occurs as a regular sign of carbon monoxide asphyxia. Gradual disappearance of the polycythemia follows as a rule with disappearance of carboxyhæmoglobin.

As a precaution a mask should be used while going to work where there is suspected coal gas hazard. But if accidentally poisoning takes place, the patient should be removed at once to fresh air. Almost all the cases revive by doing so. It is a routine practice in our gas works to allow a soda water drink when the patient is not unconscious. But it is not known whether the carbon-dioxide in the soda water is absorbed rapidly enough by the stomach as to stimulate the respiratory centre and help to eliminate the carbon monoxide from the system. Sayers (1943) has outlined the following American practice:

(*i*) The victim should be removed as soon as possible to fresh air.

(*ii*) Artificial respiration to be given if required by Schafer's method.

(*iii*) Inhalation of a mixture of 95% oxygen with 5% CO_2 given if the patient is unconscious. If given immediately this will greatly lessen the number and severity of symptoms and decrease the possibility of serious after-effects.

(*iv*) Peripheral circulation to be helped by warmth, by hot water bottles or blanket and by rubbling the extremities.

(*v*) The patient should be kept lying down at rest: should not be allowed to strain; exercise was one time suggested but is not at all to be recommended.

In severe cases of CO poisoning anoxæmia must be overcome almost immediately. End and Long (1942) showed that the ideal treatment of such CO poisoning cases would be to supply adequate amount of oxygen to anoxic tissues immediately and to maintain this oxygen supply until most of the CO had escaped from the body and to do this, oxygen under pressure of 3 atmosphere is suggested.

VI. General: The condition of health of the workmen in our factory is not bad. Signs of slight poisoning such as malaise, headache, vertigo, vomiting and incoordination of movements are not uncommon but death from carbon monoxide poisoning is rare.

No death from coal gas poisoning has been reported in our works. In all German gas works from 1885-1903, only 37 deaths from poisoning were reported among gas workers.

TABLE II—SHOWING THE CAUSES FOR LEAVE OF ABSENCE OF THE WORKERS IN ORIENTAL GAS CO., DURING A FOUR YEAR PERIOD

Years	*1945*	*1946*	*1947*	*1948*
Total cases of leave ..	2485	2486	2852	3659
Sick leave cases ..	2209	2256	2595	3346
Percentage ..	88·9	90·8	91·0	91·4
Leave for accident cases	276	230	257	313
Percentage ..	11·1	9·2	9·0	8·6

TABLE III—SHOWING THE CASES OF ATTENDANCE OF PATIENTS (OLD & NEW) AT THE OUTPATINT CLINIC OF ORIENTAL GAS CO. (1948). TOTAL CASES 33,978.

1.	Gastro Intestinal disorders (14·53).	
	a. Diarrhœa, dysentery, indigestion etc. ..	14·53%
	b. Cholera	0·02%
	c. Typhoid	0·01%
2.	Respiratory disorders (11·64).	
	a. Cold, flu, bronchitis	11·13%
	b. Asthma	0·47%
	c. Tuberculosis	0·04%
3.	Common Specific diseases (5·62).	
	a. Malaria	4·7 %
	b. Filaria	0·14%
	c. Stomatitis	0·77%
4.	Virus Diseases (0·04%).	
	a. Small pox	0·02%
	b. Chicken pox	0·02%
5.	Rheumatism & pain in body	4·92%
6.	Unclassified diseases & undiagnosed condition	11·65%
7.	Surgical (O-P)	23·42%
8.	Dental	3·10%
9.	Eye	6·36%
10.	Ear	2·53%
11.	Skin	16·19%

Tables II & III indicate the head of sickness absenteeisms at the Company. It will be found that common diseases found are diseases of respiratory organs, rheumatism and digestive disturbances.

The men working in the vicinity of the furnace and retorts are exposed to such diseases as rheumatism which are fostered by sudden changes of temperature and to digestive troubles since they are obliged to drinking large quantities of liquids, especially of unsatisfactory quality.

SUMMARY

The process in coal gas manufacture in general and in Oriental Gas Company in particular, are described at some length and the various occupational hazards incidental in the industry are discussed. Effects of excess heat and carbon monoxide poisoning are the two commonly encountered occupational hazards. The former are more common in Calcutta. The Calcutta experience shows that severe carbon monoxide poisoning is rare.

ACKNOWLEDGMENT

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CASE NOTES

A SEVERE CASE OF INFECTIOUS HEPATITIS WITH COMA

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Infectious hepatitis has assumed an epidemic form in many cities of our country during the last few years. The symptomatology of these cases consists of two syndromes mainly, *viz.*, (*i*) excretory failure and (*ii*) parenchymal failure of the liver. Cases with extreme degree of parenchymal failure lapse into coma, and the majority of them die in this condition (Himsworth, 1947). The case described below is remarkable as the patient regained consciousness after remaining in comatose condition for five days and ultimately recovered to a considerable extent.

CASE REPORT

A young man aged 25 years started with a feeling of malaise, nausea, vomiting and fever rising upto 103°F on 10-10-1949. This condition continued upto 19-10-1949. In the mean time he noticed some icteric tinge in his eyes and dark smoky coloration of the urine. On 19-10-1949 he suddenly became unconscious.

On examination his breathing was found to be rapid, pulse was not much affected, conjunctival and corneal reflexes were absent, the liver was slightly enlarged, marked icterus of the conjunctiva was present and the temperature was high.

He was given hexamine 5 c.c. 40 per cent solution with 25 c.c. of 25 per cent glucose solution i.v. followed by 20 c.c. of 7½ per cent sodium bi-carbonate solution i.v. after about half an hour. This was repeated daily for a week. He regained consciousness on 23-10-1949 after remaining unconscious for five days. Hexamine and sodium bi-carbonate by mouth was later continued.

On 28-10-1949 his liver was found markedly enlarged and tender—especially the left lobe, the lower margin of which was about six fingers below the costal margin. Marked icteric tinge of conjunctiva was present. Suspecting that it might be amoebic hepatitis, he was given six injections of emetine (½ gr. each).

On 9-11-1949 he still had enlarged tender liver of the same size, marked icteric tinge of the eyes, and temperature ranging between 102° and 103°F. Blood examination showed total W.B.C. 30,400 cmm with 90 per cent polymorphs. Penicillin one lac units every four hours was started and continued for five days. Three days after starting penicillin, his temperature became normal, jaundice was also less, and the liver decreased by one finger. He was given high protein (skimmed milk and liver protein) and methionine.

After about one month (15th December 1949) his urine became normal, there was no jaundice and the left lobe of the liver was only three fingers enlarged. The patient felt so well that he started attending to his duties.

Comments

From the above history it is clear that the patient was a severe case of infectious hepatitis. Though it is not certain as to how far hexamine, glucose, and sodium bi-carbonate helped in the recovery from coma, this line of treatment is worth a trial in such cases, as nothing else helps such a patient. It may be that hexamine in some way neutralises the evil effects of the virus of infectious hepatitis.

High leucocyte count with a relative predominence of polymorphs has been reported in such cases developing coma (Misra, 1949), though it is not a common feature in this disease. Whether it is primarily due to coma developing in such cases or is secondary to some other infection cannot be said definitely. In the above case it appears that penicillin helped in bringing down the temperature and hastening recovery. At present it seems that the case made good recovery, but we are watching him carefully for any signs or symptoms of subacute or chronic hepatitis, if they appear.

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AN UNUSUAL COMPLICATION AFTER CATARACT OPERATION

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A man of 45 with mature cataract in one eye was operated on. Extracapsular extraction of the lens with peripheral button hole iridectomy was performed. The upper incision was a corneal one. On opening the bandage on the third day it was found that the eye was doing well but there was striate keratitis, the pupil was semidilated and the anterior chamber was not formed.

During the next few days the striate keratitis cleared up but the pupil did not dilate inspite of regular atropine instillation; the anterior chamber also did not form. The eye remained in this condition for nearly two weeks after which the keratitis developed again and threatened to cover up the pupillary area.

He was operated on again in a week's time. The corneal wound was cauterised and a conjunctivoplasty was performed covering up the corneal wound with a strip of the conjunctiva from the upper part. The pupil dilated and the anterior chamber formed on the second day and the keratitis gradually disappeared. The patient made an uneventful recovery and left the hospital in a week's time.

A MISLEADING CASE OF SEVERE CONSTIPATION

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The patient, aged about 25 years, an agriculturist by occupation gave the history that he had a motion on 29-11-1949 but had none in the next two days following. He was persuing his duties normally. On 2nd December, 1949, he had a scanty and scybalous stool. On the same evening he started getting pain round about the epigastrium, the feeling of a mass and choking sensation.

On examination I found the following:

Pulse 88 per minute, of good volume and tension. Abdomen was rigid and slightly tender. Nothing abnormal was detected in the other systems.

I gave a turpentine enema, there was no response. Then after an hour I tried a high turpentine enema. The result was the same. I passed a flatus tube, but no gas came out. In the mean time, the patient vomited twice and the vomit was of (bilious) nature.

I suspected it to be a case of intestinal obstruction. But as the patient had a motion in the morning, I decided to give injection of morphine gr. ¼ with atropine sulphate gr. 1/100 and prescribed one powder containing santonin gr. ii, calomel gr. i and soda-bicarb gr. v. to be taken at 9 P. M. (as roundworm infection is most common in this area) followed by magnesium sulphate dr. 6 in the morning. I asked the relatives to give him small quantities of warm drink, if necessary. The patient passed a quiet night.

On 3-12-1949 the patient had no motion. He was kept on small quantity of warm liquids. He was given turpentine stupes on the abdomen for some time.

On 4-12-1949 morning he vomited 2-3 times. At about 11 A.M. I went to see him and found the following:

Patient was restless and had an anxious look. Pulse 96 per minute and of low volume and tension. Upper abdomen was distended and tympanitic on percussion. Again I tried a turpentine enema without any success. I advised the relatives to remove him immediately to the hospital (about 20 miles from that place) for further surgical aid but owing to some practical difficulty in removing the patient to such a long distance they simply kept on waiting. In the evening to my surprise, all of a sudden the patient had a very good motion. Distension of the abdomen was slightly less and he was feeling much relieved. He did not pass any worms. I prescribed for him mist. alba one ounce immediately. He had another motion on 5-12-1949 morning and since then he is quite all right, having had an uneventful recovery.

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AUTONOMIC NERVOUS SYSTEM & MEDIATION OF NERVE IMPULSES.

The functions of this nervous system is involuntary and beyond the control of will or volition. To express in words of Claude Bernard "Nature thought it prudent to remove these important phenomenon" (namely nutrition, reproduction, circulation and body temperature) "which are controlled by its mechanism from the caprice of ignorant will."

It may be said that violent activity like fight, flight etc., is a result of increase in sympathetic activity, whereas its opposite effect like lethargy to denote lack of power for violent activity, and conditions which occur in sleep, is due to an increase of parasympathetic (vagal) effect. Thus, emotional activities and allied manifestations are associated with and are governed by its activities. An individual may be excited with or without fear. Excitement without fear is predominantly a sympathetic response. On the other hand, excitement with fear is a complex phenomenon and is mainly due to combined effects of sympathetic and parasympathetic stimulation: for example, erection of hair, dilatation of pupils, protrusion of eyeballs, cold sweat and relaxation of gut muscles are effects of sympathetic stimulation, whereas, contraction of bladder or colon, and occasionally vomiting are effects denoting stimulation of parasympathetic system.

The earlier theory of action of drugs through nerve endings could explain a great many facts and was universally accepted. But to mention a few, drug actions, like contraction of striped muscle (which have no autonomic supply) by acetyl choline; stimulation of sweat gland (which is supplied by sympathetic fibres) by pilocarpine, acetyl choline and physostigmine; the difference of action of pilocarpine and physostigmine and denervated organs,—could not be explained by this theory.

During the period of this earlier theory, the following few very important experimental results had, however, been established which stimulated further researches that eserine (physostigmine) potentiates ganglion-free smooth muscles to the action of acetyl choline, while choline and pilocarpine are not potentiated: that eserine sensitises the frog's heart to ammonia, calcium and barium. It was also found that choline has a curare-like action on striated muscle and that curare and physostigmine are mutually antagonistic.

As a result of researches of the last half a century by Eliot (1904), Reid Hunt (1906), Dixon, Hamill, Dale (1914), Cannon and Otto Loewi (1921), Englehart and Mathes (1930) a new concept to replace the earlier theory of action of drugs on nerve endings, has gradually developed as regards the transmission or mediation of nerve impulses of autonomic nervous system.

The modern concept believes that liberation of acetyl choline is responsible for excitation of autonomic nervous system and transmission of impulses from preganglionic to postganglionic fibres whereas the postganglionic terminations liberate either acetyl choline (and the nerve fibre is termed cholinergic) or, adrenalin or sympathin (and the nerve fibre is called adrenergic). Cannon believes that adrenergic fibres may liberate two forms of sympathetic mediator substances, excitor (sympathin E) and inhibitor (sympathin I). The recent view is that all the parasympathetic fibres are cholinergic, and most of the sympathetic postganglionic fibres are adrenergic but a minority of the latter are cholinergic as for example those supplying the sweat glands. The vountary motor nerves are also believed to liberate acetyl choline at their endings and thereby produce excitation of muscles. There is no evidence so far to establish any relation between excitation or transmission of sensory impulses of any kind and liberation of acetyl choline or adrenaline at the ending of these nerves (sensory). But in the case of eye light is believed to liberate an unknown chemical substance in the retina which causes stimulation of the fibres of the optic nerves. According to Lewis, however, pain sensation is due to liberation of specific substances from the injured tissues which stimulate the sensory nerve endings to cause pain.

Evidences are accumulating to prove the existence of several centres in the brain to control the autonomic nervous system. According to Fulton (1932) there are centres in the hypothalamus controlling the sympathetic and parasympathetic systems and these are said to regulate the expressions of emotion and metabolism. There is evidence of presence of acetyl choline in the brain which may suggest some role or importance of acetyl choline in transmission of impulses within the brain, the mode of which (*viz.*, transmission of impulse within the brain), however, is not yet known.

The modern concept of chemical mediators for transmission of nerve impulses was due to the results of the brilliant research of Otto Loewi in (1921). He found that perfusion fluid, collected after vagal stimulation in one frog, when injected into a second frog would produce similar effects as by vagal stimulation in the first frog.

Further researches revealed that this vagus substance of Loewi was an unstable choline ester (acetyl

choline) capable of being hydrolysed by an esterase (choline esterase) in the heart muscle and other tissues and that physostigmine (eserine) delayed this hydrolytic action and therefore intensified the action of acetyl choline. Atropine annuled the effect. Acetylisation of the resulting ineffective choline was found to regain the original effectiveness.

The pharmacological actions of acetyl choline are the same as those of choline but about 10 to 100 thousand times stronger in effect in lowering blood pressure than choline. The action of acetyl choline is brief and very rapidly destroyed by the choline esterase whereas adrenaline or sympathin is destroyed, more slowly however, by another oxidase, called aminoxidase present in the body. The chief field for play of the esterase or oxidase is at the neuromuscular junction (apparatus) intervening between the nerve endings and the reacting cells of the body. The nature of action or counter-action by one or more drugs given at one time would therefore depend on whether the sent of action, relatively or respectively, is between the nerve ending and the esterase, or on the esterase itself; or, on or between the esterase and the reacting cells; or, on the reacting cells themselves.

Eliot, Loewi, Dale, Cannon and their followers consider that the theory of two chemical mediators is an adequate explanation of nerve impulses. Many facts however, cannot be explained even by this theory; for example, failure of atropine to control the rapid contractile response in urinary bladder after acetyl choline or to modify the reflex from Auerbach's plexus in the intestines, may be mentioned.

Bacq and Monnier, working with synthetic piperidine compound, found this to paralyse the sympathetic response to adrenaline while electrical stimulation of the nerve was still active. They therefore proposed a dualistic theory of nerve impulses (1) chemical factors, (2) an electrical or physical factor.

The details of the action produced by the autonomic nerves are therefore complex. The action of acetyl choline is complex too, and produces a wide range of effects which are not produced by stimulation of parasympathetic. Actions of acetyl choline on voluntary muscle are of considerable therapeutic interest, and these actions are not antagonised by atropine.

If we understand that there is possibly no function of the autonomic system that cannot be directly or indirectly modified by the action of drug then only we can realise the true importance of the knowledge. Some clinicians following the lead of Eppinger and Hess recognise conditions which they term "sympathicotonia" and "vagotonia". These two terms emphasise one important pharmacological fact namely that there is a very great individual variation in response to drugs like adrenaline, acetyl choline or related drugs, and to atropine.

A thorough understanding of the whole autonomic nervous mechanism, the role that drugs play, and their mode of action on this complex mechanism, and ultimately of administration of drugs based on a thorough knowledge of their effects on normal and abnormal physiological processes, could alone achieve the desired beneficial effect. It is therefore imperative for the clinician to base his diagnosis in terms of diaorganised processes affecting the organism and then to administer that drug which will be the best for the organism to return to normal function.

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CURRENT TOPICS

FOOD AND POPULATION

Lord Horder, Chairman of Advisory Committee on Nutrition F.A.O. writes in the *Lancet* (**2**:617, 1949).

It is six years since Hot Springs saw one of those awakenings of conscience, accompanied by a stirring of the imagination, which from time to time affect not only individuals but nations, and which, again in nations as in individuals, tend so soon to revert to lethargy both of the spirit and of the mind. At the United Nations Conference of Food and Agriculture, held in May-June, 1943, enthusiasm ran high, defeatism was not recognised, and the best brains in the world concentrated upon the greatest of all world problems —except perhaps the avoidance of war—how to feed the human race.

The spirit of optimism which animated the conference is shown in the speech with which President Roosevelt closed the final session:

"You have examined the needs of all countries for food and other agricultural products, both as they will exist in the short-run period of recovery from the devastation of war, and as they will exist over the longer run, when our efforts can be fully devoted to expanding the production of food so that it will be adequate for health the world over. You have surveyed with courage and with realism the magnitude of these problems and have reached unanimous agreement that they can, and most—and will— be solved."

The conference offered an excellent rallying-point for experts engaged in studying the new knowledge relative to nutrition. Largely as the result of a pooling of the researches of these experts the conference ventured to sum up the nutritional position under the following four headings:

1. The kind of diet which man required for health has been established.

2. Investigations in many parts of the world have shown that the diets consumed by the greater part of mankind are nutritionally unsatisfactory.

3. Diets which do not conform with the principles of satisfactory nutrition lead to impaired physical development, ill health, and untimely death.

4. Through diet a new level of health can be attained, enabling mankind to develop inherited capacities to the fullest extent.

Two years later the Food and Agriculture Organisation (F. A. O.), the first of the international organisations under United Nations, was set up. We were asked to advise on certain nutritional targets, taking due account of regional differences in consumption habits and possibilities of production.

The Food

It was the job of F.A.O. to find out how much food was necessary to provide the world with the requirements we laid down. The answer ran into figures which the journalist is wont to call "astronomical". It was found that by the year 1960, as compared with pre-war supplies, there would be a need of 60 million more tons of cereals, 30 million more tons of meat, 250 million more tons of vegetables and fruit and 35 million more gallons of milk. As Sir Herbert Broadley, Deputy Director-General of F.A.O., comments: "a vast undertaking indeed." Yet, such is the spirit and determination of those who lead F.A.O., there was no flinching from this gigantic task. Faced with "damage by nature and wastage by man," with "disastrous exploitations of forests, ill-conceived methods of cultivation and short cuts to wealth," F.A.O. turned confidently to the factors by which repairs could be effected, untilled land brought into cultivation, and technology harnessed to intensive production.

And who, listening to Sir John Russell's presidential address to the British Association—with his almost embarrassing catalogue of potential aids to agricultural development—who can doubt the ability of science to serve our ends in these directions? The now famous Point IV in President Truman's inaugural address was not a mere mirage; it was a call to action, and action based upon the established facts of science. To deal adequately with this technological position Sir Herbert Broadley pleads for a World Food Fund, which would supply the sinews of war. Sir Herbert thinks that the feeling of responsibility is growing amongst the nations. Let us hope he is not too sanguine in this, but we do not forget that Lord Boyd-Orr's effort at securing a World Food Board failed, and failed because member nations manoeuvred for position and for power.

But it is not only in the technological field that effort is required; there is also the economic problem that must be tackled. It is not only a question of producing more food; surpluses and slumps have to be dealt with; the food and the hungry people must come together; the producer must not be induced to "pull his punches" in one place whilst human beings are being underfed in another. "A world economy which does not provide agricultural and industrial producers with a fair basis for enchanging the products of their labours will frustrate the best endeavours to increase the supply of food which the world so much needs."

What is the present position in respect of all this? As the result of a world tour quite recently undertaken by the present Director-General of F.A.O., Mr. Norris Dodd summarises his observations as follows:

1. Methods of food production still in use in many parts of the world are extremely primitive.
2. The conditions under which the majority of agricultural producers live are "terrible."
3. Although they are producers of food, the great portion of the farmers have themselves an inadequate diet.

4. There are great possibilities of development, whether at the level of large projects of irrigation and draining or by the less ambitious method of providing the peasants with efficient hand tools. There are also great possibilities of improving agricultural production in all countries of the East.

Despite all this leeway to make up, the Director-General is not defeatist. Speaking to the United States farmers the other day he said:

"I have faith that it is not hopeless; on the contrary with the help of modern science, backed up by common sense, hard work, and international good will, I believe mankind can do a far better job of producing and distributing food than ever before. I am not optimistic enough to think that the world of plenty is round the corner, but I am sure it is down the road, and we shall eventually come to it if we only make the right start and keep moving."

The Population

"Yes," says the critic, "but what about the world population? What about Malthus's law?" Well, though common sense tells us that Malthus's law must be accepted, a little thought shows that it has only a limited and a local application. Like so many "Laws" relating to human affairs, it is an over-simplification. The desire to reduce human affairs to "laws" often overrides itself. It is not only in "this our life" that the soul gets "a dusty answer" when " hot for certainties"; in demography the same thing happens. Applied to China Malthus's law clearly operates, or may do so. The population of China is estimated—reliable figures are not available—at between 400 and 500 million, and is probably increasing at the rate of 6 million per annum. During peace, China can feed some 400 million people on the basis of a mere subsistence level. If she desires a higher standard of living, which connotes a diet giving a better margin of nutrition and therefore of health, she must do one, or both, of two things; either she must grow, or import, more, and more varied food, or else she must limit her population increase. But China may do all of these things and so demonstrate that, even in her case, Malthus's law may not be operative. The time factor is clearly imperative; will increased production, with or without importation, catch up on increased population? Or will it not?

In Western Europe, on the other hand, Malthus's law does not operate at all, nor has it for a thousand years—and for three reasons, as pointed out by Professor Whitehead: the expansion of commerce, the development of technology, and the discovery of empty continents. Although China cannot find more empty continents, industrial expansion and technological development have scarcely begun with her.

But there is a fourth factor which has operated in making Malthus's law of no sociological significance in Europe during recent years, and to which Whitehead makes no reference. This is the practice of some form or other of birth-control.

It has been alleged that so called "primitive" populations would have nothing to do with family limitation in any form, that large families are a tenet in their religion or tradition. But the view of those who have actually lived amongst such people tells a different story: the womenfolk frequently ask for information on the spacing of their children. It would seem an almost universal desire of women to seek help against the bondage of too frequent pregnancies. The working out of the principle of contraception in face of the traditional cultures and social institutions in China and elsewhere will probably fall to the lot of the women themselves. Hence the value of antenatal, neonatal, and other clinics where women may receive instruction.

Two further considerations are pertinent in this connexion. The first is that governments and other controlling authorities should not only allow, but should encourage, contraceptive instruction. Thanks largely to the work of the Family Planning Association this position has been, in a fair measure, secured in this country. Public opinion, as always, has dictated policy.

The second consideration is that more research should be undertaken in pursuit of simple, but effective, techniques. I think it was that courageous and persistent pioneer, Margaret Sanger, who commented on the fact that whereas we had succeeded in splitting the atom, with certain dire consequences to human life, we had not yet found a simple and harmless contraceptive. But we shall, and perhaps by a method quite different from those in present use. In scientific discovery the wind bloweth whither it listeth and we cannot foresee the direction in which any new addition to our armamentarium towards goal of human progress will appear. Nor, I am inclined to and, to what bad, as well as to what good, purpose man will put it.

What really matters is that we possess the will to achieve biological control as to which many of us are still in the stage of confused thinking.

I do not mean by these remarks that I regard intensive propaganda concerning the voluntary limitation or control of births as the panacea for the maladjustment of food and population in the world. History shows that when the standard of living rises, by whatever means this be achieved, such propaganda from without a social group becomes less and less necessary. It may be said of any nation that if it raises its standard of living this matter, as many others, will be added unto it.

The Spirit of Man

Sir John Russell has warned us that though science can be a very efficient provider of benefits it does not make a choice, or a decision, as to their use. That rests with the spirit of man.

But on this point, even after a second world war, I am an unrepentant optimist. I take it that a man may quote himself without being charged with plagiarism. At the meeting of this Association at Blackpool in 1936, speaking of the strain of modern civilisation, I touched on this subject. I said:

"I believe that 'man can elect the universal man'." I have faith that the human heart is 'made of penetrable stuff'. I do not think that 'damned custom' has 'braz'd it so. That it is proof and bulwark against sense'; though at this moment a morbid Hamlet, looking on, would doubtless take a different view."

Today I shall conclude my admittedly cursory review of the position by statement which, in respect of it, I may call my creed:

1. We must take a global view of the problem; unless we do so we cannot hope to solve it.
2. We must work, for we cannot escape the injunction: "If ye do not work neither shall ye eat."
3. We must encourage ideas and we must secure complete autonomy for science.
4. We can, if we will, achieve physical, chemical, and biological control on the earth and thereby effect a satisfactory adjustment in regard to food and population.
5. Moral control is the ultimate and overriding consideration. Its most primitive expression is "live and let live". Without this even survival cannot be assured.

REHABILITATION OF TUBERCULOSIS

R. R. Trail, M.C., M.A., M.D., F.R.C.P. writes:—It was some fifteen years after the Insurance Act had made sanatorium treatment available to all sufferers from pulmonary tuberculosis that the first statistical end-results began to appear. Bardswell had concluded from the Midhurst experience that something more was necessary than the discipline of regular hours of rest and exercise, good food and hygienic surroundings. The benefits of active therapy in pneumothorax and surgical collapse were then practically unknown in this country. As they were more extensively introduced many physicians were confident that the results of the new "combined intensive treatment" would give the answer for which Bardswell was looking, but a similar test of studies of mortality following discharge brought further disappointment. Collapse therapy has its place, but it is not the whole answer. In suitable cases early or at worst unilateral, it can show in expert hands a 90 per cent survival rate in five years; it does little to improve the prognosis of moderately advanced bilateral disease, and may indeed worsen it.

The same general conclusions have applied to the various drugs and antibiotics that have so far followed in the treatment of fibro-caseous tuberculosis; each has had its day, and each has been proved limited by the type and extent of the lesion or the peculiar resistance of the organism. The prognosis of the patient who commences residential treatment at a moderately advanced bilateral stage has remained fairly constant for twenty-five years; he has to depend on sanatorium routine, and he has but a 50 per cent chance of survival for five years, and a 15 per cent chance for ten years.

These findings have had three main results. Some workers have insisted that we must find the disease in an earlier stage, and as they have little or no faith in physical diagnosis, in what they proclaim more and more to be a disease of symptomless onset, they have called for the increasing use of X-rays, and now for a widening of miniature mass radiography units.

Others decry sanatorium treatment; they call it but a half-way house to death, basing their argument on the large numbers of discharged patients who seek readmission, often within two years of discharge of an "arrested" lesion. Their premises are correct but their conclusions are wrong. The sanatorium is not at fault. It can deal only with the material at its disposal. It does excellent work within its prescribed limits; it does not diagnose, and it cannot carry on its work beyond the day of discharge.

The third main trend lies with those who are disappointed with all accessory treatments and who therefore urge longer sanatorium residence. They point out the wellknown fact that the patient does well, or at worst holds his own, in the majority of cases as long as he is resident, and claim that by an extended stay a further breakdown would be avoided; in other words, they read in an entirely different light the well-known tendency to breakdown within the first two years following return to outside conditions in home and work.

Each school of thought, therefore, can claim a basis for their assertions but they should not work singly; they should be combined. Mortality after discharge is undoubtedly related to the extent of disease at admission, and the sanatorium is not to blame that it still gets, and apparently will continue to get for many years, more than 70 per cent of its patients in stage two and stage three of disease. Neither must we deny the benefits to these unfortunates of an extended stay. Successful attempts at rehabilitation of the chronic tuberculous have appreciated this point and recognized that many such sufferers required even lifelong residence in specialized sheltered conditions of home and work.

The more the chest physician sees of chronic tuberculosis the more he realizes its complexity and its individuality. Every sufferer has his own mixture of fibro-caseous lesions; everyone has also, above and apart from the common causative bacillus, his own variation of psychosomatic manifestations, some of which can be traced back to the days before his breakdown, while others result from his changed life with its new worries, economic and social. The destruction of the bacillus, or the arrest of the disease by general and local rest, will not provide the whole answer. It is certainly the general aim; it is not the particular and individual cure. Regime is a necessity, but however good it may be, and however much it may be supplemented by the latest improvements in the mechanical processs of surgery, it can fail. It may succeed in preserving life, but in itself it cannot hope to renew it. The physician must continually remind himself of the human end of treatment, which is to return his patient to home and com-

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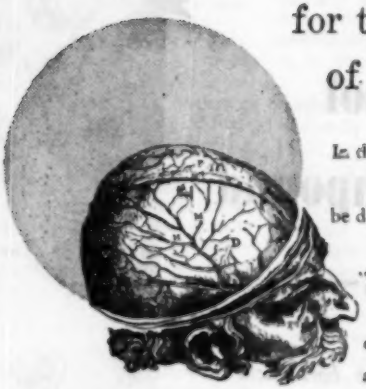

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munity life through a rehabilitation which is physical, psychological, economic and social.

Every possible modern measure should be available in the attempt to aid the patient to reach his optimum physical standard. His length of stay in the sanatorium cannot be fixed in advance, nor can his type of treatment, which the physician must be prepared to change according to the response of the patient. The long process of artificial pneumothorax may be but a preparatory stage for further surgical therapy, and while one patient may have continuous residence, another may be better if he returns on one or more occasions in order to produce a comparative result.

From the beginning attention must be paid to the patient's previous psychological difficulties of home, work and community life. We must listen to his story, which is something beyond the medical history of textbooks. We must separate those psychological stresses that preceded breakdown from the mental reactions of a chronic illness, remembering that phthisis is par excellence the chronic illness that brings frustration. Studies of mass radiography statistics have shown quite clearly that most patients are struck down with tuberculosis in its active form in the age groups seventeen to twenty-four and thirty-five to thirty-nine, and, therefore either at the beginning of their careers or at that time of life when they have every right to expect to reap the result of their previous training. Moreover, their economic worries are often the harder to bear because of the ostracism of the ignorant; few of their colleagues realize that their own danger lies with the undiagnosed case, such as the "chronic bronchitic," and never with the ex-sanatorium patient who is allowed to practise what he has been taught. Little wonder if many patients develop a sullen attitude and resist discipline; we must not be surprised if some show extreme views on life or complete apathy towards the happenings in the normal community. We should, therefore, always be prepared to give his true place to the understanding minister of religion. He is often the best adviser to the resident physician as well as to the patient and may well be a greater factor towards ultimate success than those who are now developing on scientific lines parts of his previous functions as social workers, psychologists and neuro-psychiatrists. The patient with a quiet mind and a lesion which extends throughout the whole of his right lung is often a better surgical risk than the "ideal case" who decides to accept operation because he is in a state of desolation and defeat.

Idleness was never a cure for tuberculosis; it is an entirely useless end-result to turn an ill patient into a healthy loafer who has lost the capacity or the will to work. Unfortunately, all too often the patient has instilled into him from the time of diagnosis that rest is the main factor in his recovery. Rest is the treatment for the active stage, to be applied rigorously for a period that must vary according to the needs of the individual, but rest must be followed by activity if the patient is to gain increasing vitality, recover his self-respect and get back to his family and the community, where alone he can exercise that freedom and completeness of personality which make the fundamental difference between existence and life.

Suitable work, properly controlled, will not kill the patient; it will give him hope and create in him fresh vitality. Occupational and diversional therapy have their part to play in the treatment of the bedridden patient. They must not, however, be allowed to undo the benefits of bed rest; neither must the patient be given the idea that he can be sure of making his living from goods of amateur finish. There is no more sentiment towards the tuberculous in open competitive business than for the fit worker. Therapeutic occupation within a village settlement built round a modern sanatorium has the possibilities of success that cannot lie in occupational therapy.

Sedentary occupation, with its opportunity to avoid bodily fatigue, and not "open-air work," is what is needed by the chronic tuberculous subject. Some may be fit to undertake such employment in the new factories set up under the Disabled Persons Employment Corporation, but they will still require continued medical supervision, a suitable home and a pay packet sufficient for their own maintenance and that of their families. Economic worry still drives many a man out of the sanatorium before he is fit for discharge; it will equally drive him out of any factory if he is required to exist on the good intentions of his employer.

Papworth Village Settlement can supply the conditions necessary for the man whose disease has rendered him unfit for his own work, or for a new type of work in unsheltered industry. Machines have been adapted to his needs, and the amount of energy he spends is regulated and increased by easy stages according to his individual capacity. This is done through a "Personnel Panel" of doctors and industrial managers, who have before them at each successive meeting every detail of the present medical condition of the patient, as well as reports on how he is adapting himself in his chosen workshop. He may choose between leather work, woodworking and carpentry, printing and bookbinding, building and secretarial work. While he is under under training he can get the benefits of the allowances now available through the Disabled Persons Employment Act, and when he is fit for six hours' work per day will get agreed trade union rates of pay. He may then "colonize," decide to stay on at Papworth, living in a hostel run at overhead costs without profits. If he is married he can add his name to the list of applicants for a house in the village. To that house, which he can have at a very low rental, he can bring his wife and family.

He need not fear for his children born into the village; they are supervised from birth and x-rayed and tuberculin-tested as necessary. Not one such child has so far, in the thirty years since Papworth was founded, developed pulmonary tuberculosis. Nor need he fear the too early break-up of his family life, for the boys may be apprenticed at the workshops and the girls may also, if they so wish, get employment.

The village settlement is as yet the only reliable method of attaining the true rehabilitation of the chronic tuberculous.—*Medical World*, **69**:711, 1949.

NOTES AND NEWS

THE CARDIOLOGICAL SOCIETY OF INDIA

The Janaki Nath Bose Memorial Research Fellowship of the Cardiological Society of India has been awarded this year to Dr. Priti Mitra, M.B. of Calcutta. Dr. Mitra will work at the Department of Hæmatology of the School of Tropical Medicine, Calcutta, on "Hæmatological aspects of coronary diseases." This fellowship was established last year with a donation made by Dr. Sunil Chandra Bose, of Calcutta, in memory of his father, late Janaki Nath Bose, and the first award is made this year.

CHILD HEALTH CENTRE FOR S.-E. ASIA IN CALCUTTA

A child health training centre for South-East Asia is proposed to be established at the All-India Institute of Hygiene and Public Health, Calcutta, at an estimated capital and recurring expenditure of nearly two million dollars in collaboration with the United Nations Children's Emergency Fund.

At a press conference Lt. Col. C. K. Lakshmanan, Director of the Institute said that he was very confident that this centre will be established during next one year or two. Naturally it would take time to complete the work of establishing the centre and the two million dollars proposed to be financed by the UNCEF were towards meeting the capital and recurring expenditure spread over a period of five years, he added. The centre will be the only institution of its kind in this region.

Sj. Lakshmanan said that a proposal was put forward by the Government of India to the W. H. O. authorities to organise the centre in India and he understood that the matter had been considered and it had been provisionally agreed to open the centre here where persons not only of India but the whole of South-East Asian region would receive training. The details of the scheme were being examined now.

NEW DIPLOMA COURSES AT THE ALL-INDIA INSTITUTE OF HYGIENE

A proposal to extend the activities of the All-India Institute of Hygiene and Public Health, Calcutta and to start a new diploma course in industrial health had been already put forward to India Government. They were looking forward to getting a mass X-Ray equipment at an initial cost of nearly Rs. 1,13,000 to be used for early diagnosis of lung diseases among industrial workers. Their idea was to mount the whole thing in trucks and go round the villages with a mobile party of three including a doctor and a technician. The work might be extended to school population at a later date.

A course in industrial hygiene has been already opened in the Institute. The problem of health of industrial workers was very many and they had not got sufficient number of doctors specially trained in that field. They have therefore started a short course of three months taking only ten students a year. The number of applicants for the training was much more however than the Institute could accommodate.

Another course opened in the Institute was in Public Health Engineering. Engineers did not get much training in the public health aspect of the subject and so the Institute, to remove this deficiency, started in 1947-48 to give qualified overseers a three months' training in public health engineering. Next year they took in qualified engineers for the course and now they were going to give a master's degree in public health engineering, the Calcutta University conferring the degree.

The Institute has introduced this year, a course in dietetics and they hoped that students passing this course would be able to utilise their specialised knowledge in hospitals, industrial canteens and community feeding centres. The institute had also opened a course in training of laboratory technicians in which not only undergraduates but even qualified doctors were getting trained.

In the field of development of effective economic and practicable methods of community health administration the Institute aimed at developing the health administration in rural areas within the economic means of the country and were now working on the basis of Re. 1 to Rs. 1-8.

In 1933 the Institute was started with two courses, *viz.*, public health and maternity and child welfare. Since then five other departments have been opened namely, Epidemiology, Microbiology, Biochemistry, Nutrition and Physiological hygiene, Sanitary engineering and Statistics. The function of the Institute was to impart training in public health, research in public health with a view to find out ways of improving the health of the people and community health and development of effective economic and applicable methods of community health administration.

COLLEGE OF PHYSICIANS AND SURGEONS OF BOMBAY.

Out of sixteen candidates who appeared at the D.G.O. Examination, the following five have passed:—

Dessai, Venctexa Quessoa Porobo; Gavandalkar, Durga Govindrao (Miss); Koppiker, Sunanda Laxman (Miss); Kothari, Anila Vrajlal (Miss) and Parikh, Jasvantlal Kalidas.

Out of seven candidates who appeared at the D.C.H. Examination, the following five have passed:—

Amin, Bhadrubha Vrijbhai; Master, Maki Ardeshir (Miss); Merchant, Jagdish Chandulal; Pandejee, Maneklal Ganpatlal and Vaishnav, Jagannathdas Naraindas.

Out of four candidates who appeared at the D.P.B. (Diploma in Pathology and Bacteriolcgy) Examination, the following one has passed:—

Shah, Hathichand Hirachand.

LUCKNOW UNIVERSITY

The Registrar, Lucknow University, Lucknow writes that the following candidates have passed in the different examinations held in April, 1950.

A. Diploma in Medical Radiology and Electricity, Part II.

1. Bhawani Sankar.
2. Braj Narain Mehrota.

B. Diploma in Laryngology and Otology, Part II.

1. Manchar Lal Bhatia.
2. Shiv Rattan Virkessar.
3. Suresh Chandra Rastogi.

C. T. D. D. Part I.

1. Girja Shankar Johri.
2. Gopal Das Agarwal.
3. Shiva Saram Srivastava.

WORLD HEALTH ORGANISATION

A press release from the WHO, Regional Office for S.-E. Asia dated May 3, 1950 states:

The World Health Assembly, supreme body of the World Health Organization is to meet for the third time on May 8, 1950 in the Palais des Nations, Geneva, Switzerland. Health Ministers and top-ranking health officials are expected to attend from a large number of the 68 countries which have ratified WHO's Constitution. Delegates anticipate that the Agenda, which contains 59 main items covering the policies, finances and present and future programmes of WHO, will not be exhausted before the end of May.

The two previous World Health Assemblies were held respectively in Rome (1949) and Geneva (1948).

The Assembly will consider requests for admission to WHO membership from four countries: Indonesia, Viet-Nam, Cambodia and Laos.

Following discussions last September at a meeting of the WHO Regional Committee for South-East Asia, the Ceylon Government is proposing that the South-East Asia Region should have fuller representation on the WHO Executive Board. At present only one of the 18 members of the Board is nominated by a South-East Asian country. He is the Board's Chairman, Sir A. Lakshmanaswamy Mudaliar, Vice-Chancellor of Madras University.

On the Agenda of the Committee on Administration, Finance and Legal Matters, which, with the Committee on Programme is expected to shoulder the bulk of the Assembly's work, is the question of arrears in the payment of member countries' contributions to WHO for 1948, 1949 and 1950. As of April 15th, 1950, only 84 per cent had ben paid of the total contributions due to WHO for 1948, 79 per cent for 1949, and 12½ per cent for the current year. The Committee will consider whether or not to maintain the provisional cut of 1,200,000 dollars made by the Executive Board in the 1950 budget (originally $7,500,000), and will discuss the regular budget estimates of $7,600,000 for 1951.

This Committee will also consider the intimations received from seven States that they no longer consider themselves Members of WHO and the attitude to be adopted by the Assembly in view of the fact that the WHO Constitution makes no provision for withdrawal. The seven countries are Albania, Burgaria, Byelorussian S.S.R., Czechoslovakia, Roumania, Ukrainian S.S.R., and U.S.S.R.

The principal task of the Committee on Programme, will be to consider and approve proposals for the 1951 Programme of WHO as submitted to the Assembly by the WHO Executive Board. The proposed programme, which is contained in a 280-page printed document, will be dealt with under three main heads:

(1) *Central Technical Services*, representing functions inherited by WHO from previous organizations, and long recognized as essential to international health work. These include services in International Epidemiology and Quarantine, Health Statistics, and the Co-ordination of Research;

(2) *Communicable Diseases*, of which there are over thirty on WHO's action list; and

(3) *Advisory Services* of direct assistance to Member Governments in strengthening health administrations and guiding the expansion of public health services.

The Committee's Agenda includes consideration of reports from more than twenty WHO Expert Committees and Groups on different aspects of WHO's programme.

A four-year plan of work to start in 1952, which was drawn up by the WHO Executive Board in January, will also be submtted to the Programme Committee. Considered of far-reaching importance, the four-year plan includes proposals for a broad regionalization of the Organization's work with thorough decentralization of functions.

India's delegation to the Third Health Assembly will be led by the Minister of Health, Rajkumari Amrit Kaur, the value of whose practical and constructive contributions to discussions in previous World Health Assemblies has been generally recognized. She will be accompanied by Dr. K. C. K. E. Raja, Director General of Health Services, Dr. C. K. Lakshmanan, Director of the All-India Institute of Hygiene and Public Health, Calcutta, and Dr. C. V. Ramchandani Assistant Director General of Health. Dr. Raja was a member of the WHO Expert Committee on Epidemiology and Quarantine which met last December, while in February Dr. Lakshmanan attended the first meeting of the WHO Expert Committee on Professional and Technical Education.

Sir A. Lakshmanaswamy Mudaliar will also attend the Assembly in his capacity of Chairman of the WHO Executive Board.

The leader of Ceylon's delegation will be The Hon'ble S. W. R. D. Bandaranaike, Minister of Health. Assisting him wil be Dr. C. T. Williams, Assistant Director of Sanitary Services and Dr. W. A. Karunaratne, Medical Officer of Health.

* * * *

WHO ANTIBIOTICS PROGRAMME

A world programme designed to stimulate research in the field of antibiotics, and to improve the available production and distribution of this new group of powerful drugs, has been drafted by the WHO Expert Committee on Antibiotics which held its first session in Geneva last month. The experts met under the chairmanship of Dr. Ernst B. Chain, F.R.S. of the Health Institute, Rome, Italy, co-discoverer of the uses of penicillin, and included Dr. Selman A. Waksman (U.S.A.), discoverer of streptomycin, and leading scientists from France, Great Britain and Sweden. Dr. S. S. Sokhey, late Director of the Haffkine Institute, Bombay, and now Assistant Director General of WHO, was also present at the meetings of the Expert Committee.

The more important antibiotics include penicillin, streptomycin, chloromycetin, aureomycin, tyrothricin and basitracin. Other recently discovered anti-biotics, whose potentialities are not yet determined, are nisin, neomycin, terramycin, subtilin and esperin.

As regards the present position in antibiotics work, the experts underlined that "such rapid changes occur in this field that every effort should be made at training scientists and technologists to be able to keep abreast of new developments".

The best way to increase the potential of antibiotics production, the experts suggested, was to develop training facilities for the highly-skilled personnel needed and to stimulate basic research in this expanding and very promising field of science. The World Health Organization could best assist, in their opinion, by sponsoring research programmes and granting long-term research fellowships.

The Expert Committee recommended that WHO make every effort to procure equipment and supplies for national governments wishing to develop their own antibiotics production and unanimously declared that Podbielnak extractors, considered essential for the economic production of penicillin, could not in the present state of knowledge be used for processes connected with biological warfare.

The experts were also of the opinion that WHO should organize controlled investigations into the therapeutic effects of the new drugs whch have taken a prominent place in the treatment of infectious diseases of man and animals.

The report of the WHO Expert Committee is being submitted to the "Ad Hoc" Committee of WHO Executive Board, now meeting in Geneva prior to the opening of the Third World Health Assembly on May 8th.

SIR UPENDRA NATH BRAHMACHARI RESEARCH FELLOWSHP

Applications are invited from medical graduates for the above fellowship of the value of Rs. 200/- per month for one year at the first instance with provision for extension for another year on satisfactory work. The candidate will work in the Cardiology Department of the Medical College Hospital, Calcutta and will be a whole time worker.

Applications giving an outline of the proposed scheme of work should be sent by registered post to the Jt. Hony. Secretary, Cardiological Society of India, 67, Dharamtala Street, Calcutta by the 30th of June, 1950.

PHARMACY IN THE UNITED STATES

The following is excerpted from the reports on pharmacy in the United States of America, prepared by the American Pharmaceutical Association:

Hydrogen Ion Concentration and Osmotic Properties of Lacrimal Fluid—There is considerable controversy in the literature concerning the physico-chemical properties of lacrimal fluid. The pH, as normally determined, colorimetrically or electrometrically, has been reported to have values ranging from 6·3 to 8·6. There is also confusion in the literature concerning osmotic properties of lacrimal fluid. In studies conducted by Mr. Harry W. Hind, practising pharmacist of San Francisco, and Dr. Frank M. Goyan, of the College of Pharmacy, University of California Medical Center, San Francisco, California, the authors conclude that the pH of tears is approximately 7·4 and that the pH increases very rapidly to a value of 8·2 or higher on standing under conditions which permit loss of carbon dioxide. The authors also state there is now general agreement that tears are isotonic with 0·9 per cent sodium chloride and that the value of 1·4 per cent, often given, is incorrect. (Journal of the American Pharmaceutical Association, Scientific Edition, **38**: 477, 1949.)

Procaine Penicillin and Sulfonamide Antagonism—Prior to the certification of procaine penicillin preparations by the United States Food and Drug Administration, consideration was given to the possible antagonistic action of the procaine portion of the molecule for the sulfonamides. On theoretical grounds it was decided that the amount of procaine absorbed from the usual human dose of the relatively insoluble procaine penicillin in oil (300,000 units), would be so small that it would not exert any anti-sulfonamide action. However, since it was proposed to utilize as much as 1·5 to 2·4 million units of procaine penicillin in oil in a single injection in the treatment of early syphilis, it was thought desirable to investigate possible antagonism.

Dr. Henry Welch and co-workers of the Antibiotics Division of the United States Food and Drug Administration, Washington, D. C., administered one and one-half million units (0·62 Gm.) of procaine penicillin intramuscularly to each of 36 normal male adults. Three hours later samples of blood were

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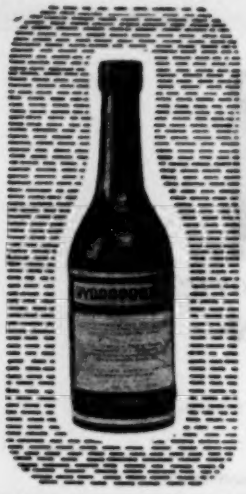

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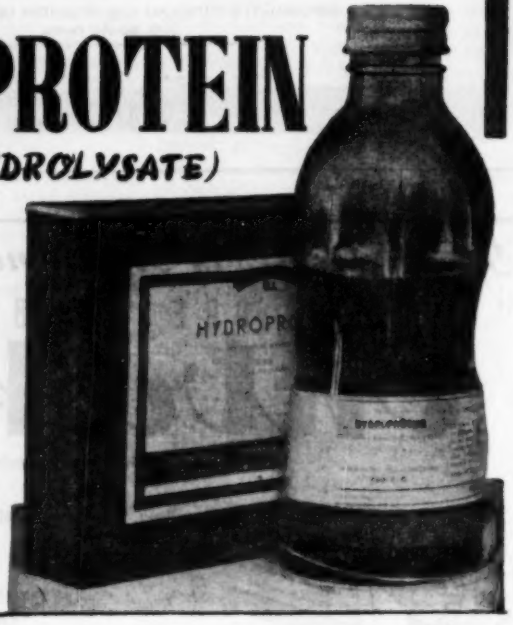

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collected and immediately analyzed for penicillin content and for procaine or its derivatives. It was found that a major portion of the procaine was converted to N-acetyl-p-aminobenzoic acid. A very small amount was converted to N-acetyl procaine while in seven instances out of 36 blood samples analyzed, low concentrations of free p-aminobenzoic acid were detected. These results indicate that procaine penicillin may be administered with sulfadiazine, sulfathiazole, and sulfapyridine, but may be antagonistic toward sulfanilamide. (Journal of the American Pharmaceutical Association, Scientific Edition, **38:** 544, 1949.)

Importance of Professional Control of Drug Distribution—There are obvious reasons why the production and distribution of drugs and medicines should be continuously under the supervision of qualified professional personnel, states Dr. Robert P. Fischelis, Secretary of the American Pharmaceutical Association.

In an editorial appearing in the Journal of the American Pharmaceutical Association, Practical Pharmacy Edition (**10**:596, 1949), Dr. Fischelis points out that as soon as the distribution of drugs is placed in the hands of persons who are not licensed pharmacists or working under the immediate supervision of licensed pharmacists, the public loses the protection which the state has endeavoured to guarantee.

Pointing particularly to unfortunate errors which creep into the production or packaging of drugs, or the unexpected side reactions which sometimes occur when new drugs are marketed, Dr. Fischelis emphasizes that in such instances the professional control of drug distribution is indispensable. Since the names and addresses of licensed pharmacies, physicians' offices, and hospitals are known, it is possible to alert the entire medical and pharmaceutical professions when the need arises to withdraw drugs from the market.

Cardiovascular Diseases—"Diseases of the heart and circulation today are our number one public health problem." This is the statement made by Dr. C. J. Van Slyke, Director of the National Heart Institute of the United States Public Health Service, in an article appearing in the Journal of the American Pharmaceutical Association, Practical Pharmacy Edition, (**10:** 530, 1949).

The article, "Problems of Heart Diseases," is intended primarily to provide background information to United States pharmacists who are participating in the continuing health information program conducted co-operatively by the American Pharmaceutical Association and the United States Public Health Service. Currently, over 15,00 pharmacists are provided with bimonthly informational kits on the subject of cardiovascular diseases. These kits consist of display material for tne public and informational material for the pharmacist and his staff. The American Heart Association is the third sponsor for the current program.

Dr. Van Slyke points out that although medical science has classified more than 20 types of heart disease capable of causing death, there are approximately 5 types which account for the grim picture. Congenital malformation, due to the failure of the heart to develop properly during the prenatal period, and rheumatic heart disease, a condition frequently left in the wake of rheumatic fever, are the two heart conditions encountered in childhood. Syphilitic heart disease, while appearing most often in middle age, is usually a late result of a syphilitic infection contracted in early adult life.

The remaining two heart conditions of outstanding importance, Dr. Van Slyke points out, are hypertension, where prolonged high blood pressure of an unknown origin has affected the heart, and coronary arteriosclerosis, a hardening of the nutrient arteries supplying the heart.

Dr. Van Slyke believes that the pharmacist, as a force in his community, can lend his influence and assistance in helping to eliminate fear and fatalism in connection with heart diseases by informing the public of the essential facts known to medical science. By urging patrons with symptoms to seek competent medical advice, Dr. Van Slyke believes also that the pharmacist can be instrumental in guarding individual health—*U.S.I.S.*

ART THERAPY IN SANATORIA

How the National Association for the Prevention of Tuberculosis, "believing in the value of art not only as a means of individual expression but as one definite source of mental and bodily healing," decided three and a half years ago to experiment in organizing practical art therapy is described in a recent letter to The Times from the Social Welfare Secretary of the Association. From humble beginnings—regular art competitions and teaching by correspondence courses and by personal visits from art teachers were introduced into some eight sanatoria—the endeavour has grown under the guidance of Mr. Sam Spencer, a well-known artist, until it now covers 120 sanatoria extending from the north of Scotland to Cornwall. Art competitions are held at least six times a year, and interest has become so keen that 140 patients, either discharged from sanatoria or awaiting admittance to one, are also participating in the scheme. During the past three and a half years, a panel of 12 artists have paid 400 visits to sanatoria; and the conviction is expressed that the work will be extended still further. Countries as far apart as Malaya, Fiji, Australia and Trinidad have shown an interest in the idea. One scheme in operation at a sanatorium in Victoria, Australia, is based on the suggestions of the Society made when the medical superintendent visited this country. Outlining the conclusions reached after this period of operation, the Social Welfare Secretary writes: "(1) In spite of some initial scepticism, the authorities now realize the value of art as a factor in the arrest of tuberculosis. (2) In patients of all ages and both sexes it satisfies some deep creative impulse, especially among those who are not attracted by handicrafts. (3) The scheme does not claim to teach art or train commercial artists; nevertheless a handful of really talented patients have discovered their own gifts through this opportunity, and some of them have won scholarships to schools of art." —*J. Roy. Inst. Pub. Health & Hyg.*, **12**:251, 1949.

CORRESPONDENCE

The Editor is not responsible for any views expressed by contributors

DOCTOR'S DRESS

Sir,—This is an interesting topic that is being discussed in the J.I.M.A. recently, and as Dr. Chowhan has dealt with the subject rather extensively in the January issue and has invited comments from the profession, I feel that I should offer my opinions on the matter.

The first question that naturally arises on a dispassionate consideration of the subject is whether there is any imperative necessity for a dress reform at the present moment, especially when the profession itself is not yet unified on a national basis, and various "pathies" and "systems" are vieing with one another for recognition and striving for supremacy, not so much on their inherent excellence, but on other pleas like patriotism and tradition.

The next question, is as to what is wrong with the fairly common dress that is worn by a medical man who professes what is called the modern or scientific system of the medicine?

As regards the letter of Dr. Chowhan, he seems to have mixed up two subjects under one head, *viz.*, the matter of dress reform, and the problem of professional ethics as regards the exhibition of medical armamentarium like the stethoscope, with a view to advertisement. The latter problem stands on a definitely different footing. But the arguments offered by Dr. Chowhan seems to be rather confused, as he puts in a plea for a badge, or an armband to be used by the doctors, so that they may be recognised as medical men in a heterogenous crowd. Here, there seems to be an implied craving for advertisement, though he rightly emphasises that it must be the duty of a doctor honourably coming forward and offering his services without being requested. However, most of the modern medical men prefer to carry their stethoscopes in the emergency bag or a separate leather pouch, especially as they do not like to spoil the shape and neatness of their coat pockets.

As far as advertisement is concerned even in the western countries, where professional ethics is believed to be strictly observed, those who want vicarious advertisement, take to various ingenious methods to gain their ends without coming into the pale of the law. Just to cite an example, a doctor, bent on advertisement visits a popular cinema show, and when the show is on, gets a friend or accomplice to get slide intervened by the management, saying that Dr. X. Y. Z. is wanted urgently to attend an emergency case. The management immediately puts the lights on, momentarily, so that Dr. X. Y. Z. can easily go out under the admiring gaze of the public, in the bright light of the auditorium. So, within tolerable limits, professional ethics should rather be left to the good sense of the doctor himself, instead of legislating about it.

Now coming to the question of dress: *Turban as a head dress*—A modern doctor has usually a cropped head, and rarely wears any head dress when he is inside a hospital, consulting room, or when he is doing his duty rounds in the wards. When conducting any operation, he is obliged to wear the modified "Gandhi Cap" when he goes about in the streets, he usually uses a car or some other vehicle, and he prefers to sit without a head dress or usually wears a hat. The turban may conform to the Indian tradition, but as far as a medical man is concerned there is not much to commend it, except, as my professor of midwifery used to say, that the long and thin turban cloth can be boiled and used in the place of the plugging gauze, in the absence of the realstuff, when dealing with an emergency case of profuse hæmorrhage in placenta previa or in P.P.H., in an out of the way place.

The Bush coat—Dr. Chowhan advocates this garment as of par excellance for universal use, as a uniform for the medical profession. Now, the question is, how does this differ from the ordinary coat that is usually worn by a medical man? The common coat has multiple pockets, which can house all the minor armamentarium of the profession, like the thermometer, the pencil torch, the knee-percussor, the measuring tape etc. Except that the bush coat is the fashionable garment of the day, there is not much to admire in it, which is not available in the former. As a uniform dress for the medical profession it is a definite wash out. As we go along any busy street in a city, we find every other man from the unemployed youngster (who is anxious to hide the absence of a clean shirt), to the opulent business man, not to mention the ubiquitous Sindhi evacuee, sports a bush coat of varying fancy material and value. How is the medical profession going to prevent these people from wearing this apparel when we adopt it as our special uniform dress? After all is said and done, the two coats are so much alike in their utility, that a "Brutus can raise a ghost as well as Caesar".

The Pyjama, Kurta etc.—The same arguments may be adduced for common trousers, as against the pyjama as above. One is of thin material likely to go out of shape and look shabby soon, whereas the other is usually of thicker stuff, and likely to keep its shape and crease for a longer time.

Now to sum up, considering the pros and cons for the suggestion of dress reform, I suggest that the matter should be left to the good sense of the medical man himself, instead of making any attempts as regimentation. How far a uniformity in dress is going to help the progress of the profession or the ethics, thereof, is a very moot point. What is the advantage of dress uniformity when the professional ethics, the skill, or the intelligence of the person inside the stereotyped dress is so variable and often so deplorable? Is it of any benefit to the country as a whole, or even the medical profession itself, if all the alumni of the profession should parade themselves in a uniform attire with an armband, an insignia or a badge like the notorious Kuklux Klan of America?

It is often stated that a medical student learns to be a dandy even before he knows how to dissect a human body. In comparison with the students of other professional colleges and arts colleges the medical student is a well dressed and stylish gentleman. The dress of a medical man should be (and usually is)

clean, neat, attractive and convenient to the occasion. As regards the type of dress, it is best to leave it entirely to the good sense of the doctor himself.

A grateful patient, when he describes a good doctor, does not admire his dress, or appreciate his kindness of heart or his intelligence, but simply says "unke Hathme Shaffa Hai". I am, etc.

1-2-50. S. R. MANEL, M.B.B.S.,
Bangalore

* * * *

Sir,—I have just perused the letter of Dr. J. S. Chowhan and I am sending my comments as desired:

Dr. Ramarao and Dr. Chowhan have stated what should be the dress of a doctor but I should say what should be the uniform of a Bengalee practising physician of different systems of treatment. A physician's dress should be as simple as practicable on the principle of plain living and high thinking and it should commend a respect just as Vidyasagar could have in his days.

A plain Dhoti, a white "neema" to cover all parts from the neck to buttock and these should be specially made—Vidyasagaris—which can be used to cover the body or head as turban for protection of body from heat and cold all over the seasons. A pair of slippers or 'Binama' will suffice to become a venerable gentleman. But he should have a decent canvas bag to keep stethoscope and other instruments. The name of the physician should be there, for his identification. This must be a suitable dress and in case of necessity first-aid may be given with "Bidyasagar"—I should invite all our Bengal medical practitioners to introduce this system of dress by all means.

I completely agree with Dr. Chowhan to his proposal of not hanging stethoscope as our young friends are often tempted to do, as it makes him awkard and inferior at the first sight, so he can't command respect from the people and is certainly ridiculed by the educated public.

The "Kortha" should be used also as "Kacha" which will give one protection to the scrotum and this will make one more smart and tidy while walking and attending to patients.

A heart specialist friend of mine, carelessly suggested to me that if a doctor wear "Pant and Coat" he may canvas for such a practitioner. This young man might have some hobby for such European costume which should be discarded by all men in Free India while everybody should introduce his own national dress by all means.

As regards medical ethics, I am sorry most of us have no respect for any such thing so we lower ourselves in the estimation of lay public. We should thus be careful for our own guidance.

As regards professional discipline in general, we regret we have rarely any sense of discipline and not to speak of the profession. So members of all branches of I.M.A. will be pleased to organise discipline at every stage of our standing with one another and with the public.—I am, etc.,

4-2-50. A. K. SARCAR, M.B., D.P.H.
Nabadwip, West Bengal.

SOCIETY FOR RELIEF OF WIDOWS AND ORPHANS OF MEDICAL MEN

Sir,—In India there are a large number of orphans and widows of the medical men. Many of them, though one time they might have seen better days, may not be in a position to make both their ends meet easily at present. The education of a number of orphans is being neglected for want of funds. Are there any funds to help these orphans and widows? If so, can you mention any? If not, may I request the members of the medical profession to come forward with the idea of forming a society for relief of widows and orphans of the medical men.

I think it is a high time to organize a society like this. I am, etc.

K. D. SHAH, M.B.B.S.

19-3-1950.
Bank Road, Baroda.

COMMON BASIC DIET FOR INDIANS

Sir,—May I draw your kind attention to the British Medical Association's Nutrition Committee's Report published in B.M.J. to-day under the caption "Adequacy of the National Diet".

It is high time that the Indian Medical Association should form such a committee with the technical help of the Nutrition Adviser, Government of India to plan a cheap and adequate common basic diet for Indians.

It is essential that required calories should be worked out in India for children, men on light work, men on heavy work, women on medium work and for pregnant women in the second half and it is imperative to plan the diet which should contain adequate amount of protein, iron, calcium, vitamin A, vitamin D, vitamin B complex, vitamin C and iodine. If such a diet is planned for the whole of India then the habits of eating a large quantity of food by some will also be changed and demand for a particular foodstuff at certain part of India will not be acute. Balanced diet gives bright health.

Clinical assesment and finding out a cheap, wholesome and adequate dietary requirement is very important to build up nation's health.

Side by side with the "Grow more food" campaign by the Centre the consciousness of adequate and scientific dietary should also have its place. Through the radio, cinema, schools, colleges and the like people should be made conscious of wholesome balanced mixed diet of an amount which should supply the caloric requirement and should not increase the bulk of consumer. The Indian Mediial Assoiiation should set up such committees at every branch in different states and even in villages to work under expert supervision and advice.—I am etc.,

K. D. LAHIRI, M.B.B.S., F.D.S. (LOND.)

4-3-1950.
Edinburgh.

CURRENT MEDICAL LITERATURE

Tuberculosis of the Trachea and Major Bronchi

Olsen and Hinshaw (*Am. Rev. Tub.*, **60**:32, 1949) of the Mayo Clinic point out that tracheobronchial tuberculosis is now recognized as a frequent complication of pulmonary tuberculosis and is a serious problem which significantly alters the prognosis of the pulmonary disease.

Bronchoscopic examination is essential to the diagnosis of tracheobronchial tuberculosis and ideally should be performed on all patients admitted to sanitariums because of tuberculosis.

Preliminary reports of the treatment of tuberculous ulceration of the trachea and major bronchi with streptomycin have been most encouraging. Ulcers of the larynx and tracheobronchial tree were reported to have healed with amazing rapidity in the few cases in which such treatment was carried out. It was feared that results would be less dramatic when a larger series of patients were treated with streptomycin. The experience of the Veterans Administration, however, has amply confirmed the earlier impression that ulceration of the larynx, trachea, and major bronchi responds most satisfactorily to treatment with streptomycin. The report from the Veterans Administration stated that the ulcers of all of the 81 patients treated had healed.

The question of the permanence of cure in cases of ulceration of the tracheo-bronchial tree is a matter of great importance. The Veterans Administration reported only one recurrence in a series of 81 cases.

In this paper the authors describe the results in three of the earliest cases of tracheal and bronchial ulceration in which treatment with streptomycin was employed at the Mayo Clinic. These patients have remained under close observation for from one and one-half to three years since treatment was completed.

The three cases reported demonstrate the prompt and apparently permanent healing of ulcerative tuberculosis of the trachea and bronchi which would never have been anticipated with any previous method of treatment. There has been no recurrence of disease in these patients during the interval of one and one-half to three years of observation since healing was achieved. These cases were unique in that the parenchymal pulmonary tuberculosis in each was relatively minor as compared with the extensive and serious tracheobronchial lesions. It is obvious that antibacterial therapy could have no effect on fibrotic stenosis of the trachea and bronchi. Yet, when the ulcerating mucosal lesions healed in these cases, there was much less stenosis than was anticipated, and pulmonary resection which had been considered was unnecessary.

Equally dramatic results have been observed in three additional cases. Two of these patients had had thoracoplasty previously for extensive parenchymal disease but bronchial ulceration had persisted and probably had progressed. Prompt healing of the bronchial ulceration was observed after treatment with streptomycin but considerable fibrotic stenosis persisted. Cultures of the sputum and of gastric contents obtained during fasting were converted from "positive" to "negative" in both cases. The third patient responded favorably to treatment for tuberculous disease involving the mucosa of the left main bronchus with extensive ulceration and narrowing but eventually required left pneumonectomy.

The use of streptomycin has apparently reduced the danger of bronchoscopic manipulation and biopsy in the presence of tuberculosis. The authors no longer hesitate to remove granulation tissue from the trachea or bronchi, take specimens for biopsy, or dilate stenotic bronchi of tuberculous patients. In fact, the removal of obstructing tissue is often apparently essential to the complete treatment of such lesions.

The present trend in streptomycin therapy for tuberculosis is toward reduction in dosage. The present practice of the authors in the treatment of tracheobronchial tuberculosis is to administer 1 Gm. of streptomycin daily in two equally divided doses at twelve hour intervals or at a single injection. Even smaller doses may prove to be adequate. The parenteral method of administration is far more effective than the ærosol method alone in the treatment of these lesions. There is some evidence to indicate that combind therapy may be more rapidly effective than injection therapy only. If ærosol therapy is to be used, it is recommended that 0·5 to 1·0 Gm. of streptomycin be given daily in a concentration of 100 mg. per c.c. of physiologic salt solution.

The same toxic reactions which have been observed in most patients treated with streptomycin for any period of time were observed in this group of patients who had tracheobronchial lesions. Vestibular complications were frequent and were troublesome in some of the early cases but should be much less in future cases in which smaller doses of streptomycin will be used.

The excellent results obtained in cases of tracheobronchial tuberculosis have gone a long way toward establishing the efficacy of streptomycin in the treatment of tuberculosis. The introduction of streptomycin therapy has changed the attitude of the medical profession toward tuberculosis of the tracheobronchial tree. What was previously regarded as a most serious complication is now shown to be amenable to therapy. Early and accurate diagnosis of tracheobronchial tuberculosis becomes of great importance now that an effective therapeutic procedure is available.—*U.S.A. News Letter.*

A Concentration Method of Tubercle Bacilli in Sputum

Okada (*Tohoku J. Exper. Med.*, **51**:1, 1949) writes that he has contrived a method of concentration by which he can produce a good result without any high speed centrifuger or other equipment. That is to say, it is a method that one takes sputum in a evaporating-dish and heats and condenses it. The method is quite convenient and practicable to any general medical practitioner.

Thus, by this method, he can condense the sputum to 1|5-1|15 size of the original. Among the 16 experiments of the negative sputum he could find the bacilli in 10 examples; among 6 examples in which the bacilli could be seen only by culture, the existence of the bacilli could be testified in 3 examples.

In this method, the fixation and dyeing the smeared sputum is quite the same as the preparation of ordinary specimen.

Direct Radiologic Diagnosis of Tracheobronchial Tuberculosis

Tapia (*Gac. Med. Portuguesa*, **1**:431, 1948, Ref. *Radiology* **53**:447, 1949) discusses the problem of the radiologic diagnosis of tracheobronchial tuberculosis. Tomography was found of considerable value, especially when bronchoscopy was contraindicated or when the lesions could not be visualized. The diagnosis in most cases was confirmed by bronchoscopy.

After describing the normal tracheobronchial tree, the author analyses the alterations which lead to the tomographic diagnosis of tracheal and bronchial lesions. These alterations are as follows:

1. Changes in the bronchial caliber
   - Homogeneous stenosis
   - Stenosis with sinuous contour
   - "Wasp-waisted" stenosis
   - Funnel stenosis.
2. Changes in the ronchial contour
2. Changes in the bronchial contour
   - Localized waving, giving a mammillated image
   - Serrated contour.
3. Demonstration of hilar bronchi, normally invisible
4. Ampullar dilatation of the first bifurcation
5. Alteration of the tracheal contour
6. Appearance of calcified lesions on the tracheobronchial wall.

Early Roentgen Recognition of Lower Lobe Tuberculosis

Ostium and Serber (*Radiology* **53**:42, 1949) write that pulmonary tuberculosis originating in the lower lobe is generally considered uncommon because (a) most cases are discovered late, when spread to the rest of the lungs has already occurred, and (b) the midlung or "perihilar" infiltration is not recognized as actually lying in the upper portion of the lower lobe. If the disease were discovered earlier and a film taken in the lateral position, the reported incidence would be markedly increased.

Ten cases of lower-lobe tuberculosis have been reported. While this series is not suitable for statistical analysis, it shows, like those of previous investigators, that this disease occurs predominantly in young women. The extraordinarily high incidence in nurses, reported by others, is also confirmed.

The most frequent site of the early lesion is in the apex or subapex of the lower lobe. On the routine chests film this produces characteristic transverse lines of infiltration which extend from the hilus toward the periphery or may be limited to the middle or peripheral portion of the lung at or just below the level of the hilus. The transverse position of these lines, as well as their beaded or finely nodular appearance, make it possible in many cases to distinguish them from normal bronchovascular markings and other infiltrative processes. It is at this stage that the diagnosis should be made and confirmation sought from clinician and pathologist, before massive consolidation, cavitation, and spread have occurred.

Streptomycin in Human Tuberculosis

Karanchandani and others (*Lancet* **2**:886, 1949) of Government Wellesley Tuberculosis Sanatorium, Bellary, South India, write:

47 cases of tuberculosis treated with streptomycin are analysed. These cases were separated into six groups: group I exudative, group II pneumonic, group III fibrocaseous, group IV intestinal, group V pleural in addition to pulmonary, group VI miliary—(1) acute, and (2) chronic.

Of 27 cases in group I, 11 gave a favourable response; of 4 in group II, 2; of 3 in group III, none; of 5 in group IV, 5; of 4 in group V, 3; of 1 in group VI(1), 1; and of 3 in group VI(2), 2.

The shortest period of observation was 6 months and the longest 17 months.

Cases less advanced than IIIC responded most favourably, women better than men, and the age-group 14-25 came out best.

Case-records of illustrative cases are given, and a questionary set before the investigation is answered.

Administration of streptomycin other than institutional, or other than by experts, is deprecated.

Streptomycin in Tuberculous Sinuses

Davis (*Lancet*, **2**:982, 1949) writes that systemic streptomycin therapy has been given to 11 patients with 26 draining cutaneous tuberculous sinuses, which in 5 cases originated in bone and in 3 followed thoracoplastry, in 2 nephrectomy, and in 1 Monaldi drainage.

This treatment has a definite value for sinuses developing in the thoracoplasty or abdominal wounds of tuberculous origin, and the response of sinuses originating in bone is dramatic.

A plea is made for the treatment of tuberculous abscesses by early drainage under streptomycin cover, but further experience will be necessary to determine the best time for such drainage.

Thoracoplasty for Tuberculosis

Wu (*Chinese M.J.*, **67**:476, 1949), basing on a review of recent literature and their observations in the series of 125 operations on 55 patients, gives the following conclusions:

Thoracoplasty is an efficacious type of treatment for selected cases of advanced pulmonary tuberculosis. It offers a 60 per cent chance of clinical cure and a 75 per cent chance of a satisfactory result.

Thoracoplasty is a safe procedure, with an immediate mortality rate which should be less than 5 per cent by number of patients and less than 3 per cent by number of operations.

This procedure should be carried out much more frequently than now is the case in China. The general medical profession and the public need to be more thoroughly informed on this subject.

The following types of patients are considered to be suitable for thoracoplasty: (A) Those with predominately unilateral far advanced lesions with cavitation and fibrosis, in which there is little hope for recovery of the respiratory function of the lung tissue even after the tuberculosis had healed. Thoracoplasty should be done as a primary procedure in such cases. (B) All cases considered suitable for pneumothorax but in which the latter proves to be unsuccessful or unsatisfactory. Or during the course of pneumothorax

therapy, when impending empyema, atelectasis or unexpandable lung develops. (C) Tuberculous empyema. (D) Extensive pulmonary fibrosis, pleural thickening and marked mediastinal shift. Thoracoplasty is indicated even when the pulmonary tuberculosis is no longer clinically active.

Thoracoplasty is to be avoided in the following types of cases: (A) Relatively fresh exudative lesions. (B) Hopeless bilateral advanced lesions. (C) Lesions in patients with serious cardio-respiratory disease, such as cardiac disorders with border-line decompensation, bronchial asthma or marked pulmonary emphysema. (D) Lower lobe cavity (resection is indicated) and (E) Tuberculous bronchiectasis.

Reactions to Para-Amino-Salicylic Acid

Kierland and Carr (*Proc. Staff Meet. Mayo Clin.*, **24**:539, 1949) reported four cases in which cutaneous evidences of untoward reaction developed after administration of para-aminosalicylic acid. Three patients had a diffuse generalized scarlatiniform type of dermatitis medicamentosa while 1 patient exhibited a fixed-drug eruption involving the penis. The reactions were accompanied by fever in 2 cases.

Graves' Disease

Read (*Radiology*, **52**:557, 1949) in analysing the results of a twenty-four year follow-up of cases receiving roentgen therapy writes that roentgen irradiation serves as a helpful adjunct in the non-surgical management of Graves' disease by suppressing the function of, and even destroying thyroid tissue. In so far as the thyroid participates in the pathologic physiology of this disease, irradiation will accomplish the same result as surgery. There is no mortality per se, as the treatment is unattended by any of the objectionable features, hazards, and postoperative complications and sequelæ of thyroidectomy.

The long-term results of roentgen irradiation are as satisfactory as those of surgery in terms of ultimate cure and attainment of life expectancy. This will also probably prove true of irradiation with radioactive isotopes of iodine, whose action is so similar clinically and which produce the same histologic changes in the thyroid gland.

Treatment of Acute Lukaemia with Folic Acid Antagonists

Stickney and others (*Proc. Staff Meet Mayo Clin.*, **24**:525, 1949) write that aminopterin and a-methopterin used in the treatment of patients having acute leukemia have produced complete remission lasting up to four months in cases of 5 of 21 children and 3 of 33 adults. No remissions have been maintained indefinitely and all of the patiients who are still living are now suffering from relapses. These results, although discouraging, are better than those previously obtained with other therapeutic agents.

With but few exceptions aminopterin has been used. A-methopterin (4-aminomethylpteroylglutamic acid) has been tried, but clinical and experimental results indicated that it was less potent and no less toxic in effective doses. The diagnosis of acute leukæmia was established by examination of the blood and marrow. In general the plan of treatment has been to administer 1 mg. of aminopterin intramuscularly or orally every day until toxic manifestations appear. Whenever possible use of smaller doses of the drug has been continued as long as the condition of the patient permitted. Transfusions of blood have been given for severe anæmia or hæmorrhage and antibiotics have been used in the presence of infection or severe leukopenia.

When a favourable response has occurred the degree of immaturity in the blood and marrow has decreased. Normal peripheral blood has been observed, but the authors have not seen completely normal bone marrow. High counts for leukocytes fall rapidly in some instances. The hæmoglobin and the number of erythrocytes may return to normal and the platelets may increase in number. At the time of the most marked regeneration of erythrocytes, megaloblasts may be seen in the blood and marrow. When the clinical condition of the patient improves, there may be a decrease in the size of the spleen and nodes, a lessening of the pain and swelling in leukemic arthritis and roentgenographic evidence of a decrease in the leukemic involvment of bone.

The toxic symptoms produced by aminopterin which the authors encountered have been similar to those reported by others. The commonest symptom has been stomatitis with one or many painful shallow ulcerating lesions in the oral and pharyngeal mucosa. A rather diffuse enteritis may occur with abdominal distention and bloody diarrhea. Neither of these is dependent on severe leukopenia, although frequently leukopenia and thrombocytopenia of severe degree may coexist. All of these reactions frequently may be severe enough to make it necessary to stop use of the drug. Alopecia is less common and peculiarly the hair may grow back even though administration of the drug is continued. Deafness without vertigo, which cleared promptly when use of aminopterin was stopped, was observed three times. One instance of a hemorrhagic rash simulating that of erythema multiforme was encountered.

Penicillin in Syphilitic Pregnant Woman

Tucker (*Am. J. Med. Sc.*, **217**:157, 1949) writes that twenty-three white and 126 negro women, with primary or secondary syphilis and who were pregnant, were given 0·6 to 5 million units of penicillin, intramuscularly, every two to three hours from seven to fifteen days, at the John Hopkins Hospital. Three quarters of the patients were treated after the fourth month of gestation. There were two abortions, both considered to be due to causes other than syphilis or the administration of the penicillin. All the 16 premature infants survived, though one died of sickle cell anæmia shortly after birth; 32 per cent of the live infants showed positive reactions of the cord blood. In some cases, the titre took an exceptionally long time to become negative, the longest being 121 days after delivery. This child had negative roentgenograms of the long bones and has remained clinically well throughout the first year of life without any antisyphilitic treatment.

It made no difference at what stage of pregancy penicillin was given, as far as the results were concerned. Penicillin is the treatment of choice for the syphilitic pregnant woman.

SUPPLEMENT
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ASSOCIATION NOTES

THIRD ORISSA PROVINCIAL MEDICAL CONFERENCE, CUTTACK

The Third Orissa Provincial Medical Conference was held on the 5th, 6th and 7th November, 1949 at Cuttack Dr. Gopal Chandra Pattanayak, M.B.B.S., D.G.O., L.M., D.R.C.O.G., Civil Surgeon, Kalahandi, presiding:

The following are excerpts from the Presidential Address delivered by Dr. Pattanayak:

Whatever be the method of expression, a society claiming itself to be civilised, cultured and progressive is expected to organise and make available to the members, certain fundamental necessities of civilised life. These include:—

1. Provision of a balanced diet to every body.

2. Provision of adequate hygienic housing accommodation to every family—the primary unit of social aggregation.

3. Provision of clothing for every body adequate and suitable according to climate and profession.

4. Provision of basic education for every individual.

5. Provision of a positive health service to all.

These five fundamental necessities of a civilised human life constitute the five fundamental rights of citizenship. Their provision, their fulfilment brooks no delay. They form the basis of the present day conception of a civilised life. They are the irreducible minimum demands. The society being an integrated whole, planning for the whole society must be comprehensive and all inclusive. None of these five fundamental requirements can be planned and worked for in isolation from others. But the task of a comprehensive and all inclusive social planning is not the work of one man nor of one group of men. It requires the combined efforts of all classes and all interests of the social life. We in India are still in the state of planning and that itself has not gone far ahead yet.

Dr. G. C. Pattanayak
President, III Orissa Provincial Medical Conference

After making a comprehensive survey of health conditions and health services of India, Great Britain, U.S.A. and U.S.S.R., he said:

The modern trend of Health Organisation of the world is towards the provision by the State of as complete a health service as possible and inclusion within its scope, of the largest possible proportion of the community. The need for assuring distribution of medical benefits to all, irrespective of their ability to pay has also received recognition.

Another new trend of modern medicine is the emergence of what is known as "social medicine". Disease is no longer considered in the narrow view of pathological changes of tissues of microbial and other specific origin. These may be after all secondaries. The primary causes of disease are sought in the social, economic, and environmental factors. These factors do play equally important if not the primary part in the production of sickness. In various British and American Universities, Chairs of Social Medicine have been established in recent years and a systematic study has been undertaken. In the words of the Oxford Professor of Social Medicine, John A Ryle, "socio-medical survey, that is to say, the combined social and clinical study of community health and sickness, often with special nutritional and economic assessments and careful sampling and controls" has now been accepted by the enlightened scientific world as the correct method of approach to the problem of health and disease.

Present State of Affairs—In spite of all that has been achieved in improving the health condition and health services in the country medical relief hardly reaches the masses in India. All the bigger State hospitals and institutions are situated in the larger cities. The private medical practitioners are concentrated in the urban areas. The State-managed dispensaries in the rural areas are few and far between. The available bed strength of hospital accommodation in India works out to be approximately 0·24 bed per

1,000 population where as it is 7·14 in England and Wales and 10·45 in U.S.A. The ration of doctors to the population in India is 1 for 7,000 whereas in England it is 1 for 1,000. The position in regard to the nurses, midwives pharmacists, oculists, dentists is still very much worse. Quite a good number of people still take to the indigenous Ayurvedic and Unani systems of treatment and to Homoeopathy which have been introduced into the country from abroad.

Efforts Towards Advance—The Indian Medical Association a non-official body established in 1928 represents the entire body of registered medical practitioners in India of all classes namely State employees, employees of private bodies and private practitioners. It has been voicing the legitimate aspirations of the medical profession and it has been fighting for safeguarding the interests of the profession. At the same time it has been pressing on the various authorities of the State for the modernisation of health organisation of the country. It has been pressing for the liberalisation of the outlook of the Health administrators both professional and non-professional. It was mainly due to this persistent demand of progressive medical opinion aided by the enlightened public opinion in the country that the Government of India appointed during the War time the Health Survey and Development Committee popularly known as the Bhore Committee under the able chairmanship Sir Joseph Bhore. The Committee contained some of the best medical talents in India intimately associated with the I.M.A. and Health administration of the country and also leaders of public opinion. After long country-wide tours and local studies and investigations and interviewing a large number of illustrious witnesses from the country and abroad, the Committee produced a voluminous report and made many farreaching and revolutionary recommendations.

In brief their recommendations are:—

1. Integration of preventive and curative functions into one composite and comprehensive service.

2. Provision of free medical services to all without distinction.

3. Provision of a wholetime salaried service.

4. Prohibition of private practice by the wholetime salaried doctors and provision of adequate emoluments for the wholetime medical workers.

5. Employment of part-time doctors where possible and necessary.

6. Maintenance of the principle of freedom of choice of the doctor by the patients.

Public Health is recognised by every body to be the State's responsibility. Overemphasis on Public Health and environmental hygiene on which Public Health was based is essentially a nineteenth century idea. Importance of environmental hygiene cannot be minimised but at the same time, the role the individual patient plays and the danger the community is exposed to through dissemination of disease from the individual and the vitiation of the environment from this source have all been realised in recent years. Public Health has, therefore, progressively included within its scope such items as—

(*i*) "control of community infections,

(*ii*) "education of the individual in the principles of personal hygiene,

(*iii*) "the organisation of medical and nursing service for early diagnosis and preventive treatment of disease,

(*iv*) "development of social machinery which insures to every individual a standard of living adequate for the maintenance of health,

(*v*) "organising these benefits in such fashion as to enable every citizen to realise his birth-rights of health and longevity".

(C. E. A. Winslow, The United Fields of Health, Modern Medicine, March, 1920, 2:3—Practitioner's Library Vol. XII)

Progressive medical opinion in India and elsewhere has been clamouring for and the Bhore Committee have definitely recommended the integration of these two branches of Health service namely combination of the functions of prevention and cure in the same organisation and in the same individuals. As already stated Public Health is and should always be under state control. Public Health in the modern conception includes also the curative service to the individuals. It follows, therefore, the whole Health Service with preventive and curative medicine and with the ancillary services integrated in it should also be under social control. Socialisation, therefore, is inevitable outcome of the modern conception of a comprehensive national health service scheme.

A Scheme of Socialised Rural Health Service—In the present set up of things socialised health service should spread itself in the rural areas yet untouched by any medical relief in any shape or form. The need for such service is greatest in the villages and all State efforts may profitably be concentrated there. The ideology of Mahatma Gandhi is sought to be realised in the provisions of the Orissa Gram Panchayat Act. Grama Sabhas are being constituted in villages having a population of 1500 or more and in groups of contiguous villages having a total population of 1000 or more. Several Grama Sabhas may be combined for the purpose of establishing and maintaining institutions of common interest.

Village School, the Health Nucleus—It is supposed that every Grama Sabha will have its own primary school which is bound to play a very important part in the Gram Sabha policy. The school master will serve many useful purposes besides his usual role of an educator. The main and more useful work of the village school master would however be preventive rather than curative. Health education both to the school going children and to the adults imparted by the school master will help to arouse a health consciousness among the rural people and serve to inculcate the knowledge about personal hygiene, community sanitation and to maintain good health. In addition to these, First Aid should form the most important work of the village school master. This will be necessary in the day to day life of the village community and this will be most appreciated by the villagers. A health nucleus may be formed to help the village school master. This will consist of volunteers interested in social and humanitarian work. Both the school master and the members of the health nucleus will be given training at the nearest Primary Health Unit in First Aid, Stretcher drill, Ambulance work, Home Nursing and in General Sanitation. They will not only render immediate First Aid in all emergent medical and surgical conditions but also arrange for the conveyance of the patients to the nearest hospital. They will also help the school msater in the visual and auditory health education

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work. The school master will be paid an allowance for this extra work and the volunteer members of the Health Nucleus be awarded occasional prizes and other tokens of appreciation for their voluntary social work. This is expected to create abiding interest of the workers in the health work of the village.

The first Five Year Post-War Plan of the Government of Orissa aims to establish one dispensary for 100 square miles and for nearly 28,000 people. The working radius of each dispensary will be about 5 miles *i.e.* there will be one dispensary at every 10th mile. Year by year more and more dispensaries are being established. When this programme is completed one dispensary will serve the territory of 18 to 28 Grama Sabha as envisaged by the Orissa Grama Panchhayat Act. As soon as equipment and trained service personnel are available each of these dispensaries should be made the centre of Primary Health Unit in the lines of the short term programme of the Bhore Committee Recommendations. In successive five year periods, the long term programme may slowly be worked out. This will spread out for 30 to 40 years.

In the existing conditions of the country, even the short term programme appears formidable. Until the production of health service personnel including doctors, health inspectors, nurses, midwives, dais, health assistants, pharmacists and technicians is considerably augmented, it is not possible to carry out even the short term programme. The Staff of the existing rural dispensaries at present is as follows:

Doctor	1
Compounder	1
Dai (trained)	1
Male servant	1
Sweeper	1

It is surmised that in the second five years period it will be possible to staff these dispensaries as follows:

Doctors	2
Midwives or trained Dais	2
Health Inspector	1
Health Assistants	2
Compounder trained in Hospital routine ..	1
Dispensary servants (Male & female) ..	2
Dispensary sweepers (Male & female) ..	2

Both doctors will work in the curative and preventive sides, one alternately remaining in headquarters for running the dispensary and indoor work and attending to emergencies as they arise there while the other will be moving about his area about 100 sq. miles *i.e.* five miles round about the dispensary for public health work. The Health assistant will be touring about with the doctor. The health inspector with the health assistant will be concerned with more detailed public health work and collection and compilation of vital statistics and other clerical work of the dispensary. One of the midwives or trained dais will be available for domiciliary midwifery. Each rural dispensary will in due course work as the centre of a Primary Unit in terms of the Bhore Committee Report.

To enable the people themselves to take active interest in and to ensure them co-operation with the health work the Primary Health Units will be associated with local Health Committtees formed by such of the Gram Panchayets of the concerned area as are interested in the health work. Similar association of the people's representatives will be provided by the Health Boards for the Subdivisional, District and Provincial Health Organisation as recommended by the Bhore Committee.

Free domiciliary health service particularly treatment of emergent conditions including attendance on labour cases constitute a very important part of socialised health service. Strength of health services personnel should be suitably and sufficiently augmented to permit an emergency roster system to be evolved. This will not only serve to attend immediately any emergent cases brought to the hospital or dispensary at any time but also provide for free domiciliary attendance on emergent cases within an area of a specified radius. Suitable and quick means of conveyance must be placed at the disposal of the staff for the purpose. This will considerably minimise much of the unnecessary mortality and morbidity in the country. We know that the proportion of hospital bed strength to the population in India is 0·42 per 1000 population whereas in U.S.A. and U.K. the figures respectively are 10·48 and 7·14. We also know the colossal degree of morbidity in our country in comparison with that of U. K. and U. S. A. The target aimed at by the Bhore Committee is 5·67 per 1000 to be reached in about 40 years. This means a 75-bedded hospital for each primary health unit catering for a population of 20,000. 650-bedded hospital for the subdivisional headquarters and 2,500-bedded hospital for the district headquarters. This programme is of colossal dimensions and even a confirmed optimist cannot easily reconcile himself to it. For the greatest good of the greatest number some sort of domiciliary treatment has to be initiated however incomplete. In the provincial headquarters stations and in cities where medical colleges are situated, domiciliary treatment can be introduced in the municipal area. Medical students, pupil dais, midwives, nurses, comoounders on training can be suitably employed for this purpose under the supervision of the members of the teaching staff. In Dublin such a system does exist and attendance on patients at home is considered as an integral part of the curriculum of their studies. It is proposed that students on duty in the medical, surgical and obstetric departments will in each case be posted on duty in two batches. One batch for intern duty in the hospital and one batch on extern duty for home domiciliary treatment. Calls for home treatment will be mostly of emergent nature. Each extern batch will have a medical officer usually a member of resident staff. On receipt of a call the resident doctor on duty will depute students in turn in suitable batches to attend on the case at home. If necessary students deputed may call for the services of the resident doctor who will then attend the case and take necessary steps including transferring the case to hospital. Details can be worked out easily. Regulations of the University may suitably be altered to provide for compulsory attendance on a certain minimum number of such home cases in these three subjects. This scheme has two aims in view namely it will reach medical relief to the suffering patient at home in cases of grave emergency, secondly it will afford opportunities to the students for practical training in the realistic background. A practising doctor of any experience realises the great difference between treatment at home and treatment at the hospital. The Dublin system should therefore be adopted in our country particularly in cities with Medical Colleges. This may be treated as a small beginning of Domiciliary Treatment Service.

Reorientation of Medical Education on Rural Bias and Rural Background—The vast majority of medical students

of today will be employed in rural areas. Their education and training should, therefore, have a rural bias. The scheme of reorientation of medical education on a rural background will have to be worked out in detail.

The following innovations in medical education are tentatively suggested:—

1. Right selection of students for admission into medical colleges based on merit, aptitude and physical fitness and not on the financial capacity of the parents or guardians.

2. Fully provided free medical education including free tuition, free boarding and lodging, free books and instruments and uniforms plus a pocket allowance in return of service under the state for a specified number of years on a fixed scale of pay. It should be applicable to at least 2/3rds of students. In U.S.S.R. medical education is completely free. In U. K. the Goodenough Committee has recommended that at least 1/3rd of the students should be taught free.

3. Whole-time teachers with no private practice with adequate remuneration who will utilise their whole time and energy for the care of patients, study of their subjects, teaching of students and research.

4. Deputation of medical students during each year of their medical study to rural area in suitable batches to help the epidemic staff of the Health Department in the prevention of outbreaks of epidemics and rendering such medical aid to the patients as possible. Each batch will be put under the control of a responsible officer preferably a member of the teaching staff.

5. Deputation of medical students of each of the clinical years of study to the rural dispensaries and hospitals under primary and secondary units to work there as doctor students under the local medical officers. The duration of such deputation should be one month during the long vacation of the medical college. The work will be curative at the dispensary and preventive in the area specified for the dispensary.

6. Introduction of 'Social Medicine' into the medical curriculum with special emphasis on rural conditions of our country.

7. Emphasis on the teaching of all branches of Medical Science and practice as applied to rural conditions. This includes simplification in the methods of diagnosis of diseases and treatment and after-care of patients in the out of the way places, and the utilisation of commonly available indigenous drugs, recipes, diets and therapeutic materials for the ready and on-the-spot treatment of cases.

8. Establishment and maintenance in the Medical College compounds model herbal gardens and cultivation of all medicinal and useful plants and trees and introduction of instruction in cultivation, collection and utilisation of herbs. Medical graduates attached to primary units as medical officers, will be expected to maintain herbal gardens on a smaller scale and utilise their products in their day to day practice.

9. Utilisation of all available clinical and other human materials and the talent of teachers and students for investigation and research and provision of post-graduate degrees for successful scholars. The first is the primary aim and the second is the means to that end namely as a source of encouragement for the ambitious. Research is not always necessarily costly nor does it always require well-equipped laboratories and costly apparatus. Not money but mind that is wanted.

Health Service Personnel—Abolition of Private Practice and better Scales of Pay—Besides the intelligent co-operation of the people, an honest and contented body of public servants is absolutely necessary for the success of a socialised health service. This statement is equally true for any other social service. The service personnel must devote their whole-hearted and whole-time attention to the public service and in return they must be assured the satisfaction of the primary necessities of a civilised social existence namely (1) balanced diet, (2) adequate clothing, (3) hygienic housing, (4) free medical service when ill and (5) free education, to children. Further there should be provision for covering the future. Besides these they are to have some free money for expenditure on their free will. Satisfaction of these needs will ensure a sense of security in the mind of the public servants. Security breeds contentment. This in turn will prove to be the greatest preventive measure against corruption in public service.

Social Inducement for Rural Health Service Personnel—There is a general disinclination of the doctors to settle in rural areas. There are too many doctors in urban areas and there is quite a lot of unemployment and hard struggle among doctors in towns and cities. This is the position not only in India, but also elsewhere in the world. The recently introduced National Health Scheme of the United Kingdom purports to regulate the admission of doctors in different areas in order to evenly distribute doctors all over the country. The U.S.S.R. attracts doctors to the rural areas by providing for them increased pay, free housing, free fuel, free water supply and free lighting. Here in India we may provide the following attractions to doctors and health service personnel posted to rural dispensaries in order to attract them to rural health service.

(*i*) Free provision of staple food items produced in the locality namely in Orissa—Rice, Dal and Oil,

(*ii*) Free fuel in the shape of locally available fuel wood,

(*iii*) Free education to their children in educational institutions into which they can gain admission by merit.

(*iv*) Free furnished quarters. The privilege of free quarters is already there in all rural areas.

I feel I would not be doing justice to you if I do not make a brief reference to a serving problem of the day, a problem which has been in recent years engaging the serious attention of the profession, people and the government. This refers to the alternative systems of medical practice namely Ayurveda, Unani and Homœopathy.

India is always catholic, liberal and all-absorbing. All systems indigenous or foreign are always welcome.

We all would certainly welcome the Ayurveda and Homœopathy into the Research Departments of Medical Colleges. Some research is already under way. I can vizualise a time not in very distant future the establishment of Ayurvedic and Homœopathic Research Departments in all Medical Colleges and incorporation of all their fundamentals in the medical education. I am convinced that ultimately there

will be evolution of one common scientific system of medicine by the progressive synthesis of the different systems.

The well-accepted 'basic doctor' conception precludes the emergence of another kind of doctor of different position, prestige and status. The Ayurvedic physicians of my conception should in no way be inferior to the present day officially recognised and officially controlled physicians. Necessarily therefore their education and professional training should be of the same high order as we now insist on the basic doctors. Anybody who wished to take up the profession of medicine must have one basic educational qualification namely I.Sc. with biology, Ayurvedic students taking up classical Ayurvedic medicine, surgery and midwifery. All successful students should have the same university degree with a distinctive letter to designate their speciality. All these graduates will have the same status, position and responsibility. It will therefore necessarily take five years to turn out the first batch of Ayurvedic Doctors. But since the Government is already committed to the policy of immediately utilising the services of present Kavirajas and establishing Ayurvedic dispensaries and in fact many such institutions have already been established, we have to tackle the problem, how best to utilise their services without at the same time officially encouraging quackery. My proposal in this connection is that every Kaviraj selected for appointment must be given an intensive course of training of at least six months in First aid, Ambulance, home nursing, village sanitation and in the rudiments of hospital technique as much as practicable. There is an unfortunate tendency of the present day Ayurvedic physicians to make a pretence of using medical appliances, instruments and drugs without any knowledge about them. Such fraud and malpraxis on the gullible public must be prevented with a strong hand. They will be allowed to handle such simple apparatus and drugs on which they have been given proper training after appointment. Their services should best be utilised in rural areas for giving first aid to the people and for vaccination and inoculation and for rural sanitation. Every year they should in batches be attached to sub-divisional hospitals and to the Sub-divisional Public Health Organisations for receiving further practical training in hospital technique and public health work. In due course, I feel, they can be safely entrusted with handling anti-malarial drugs and sulphaguanidin tablets for dysentery and cholera. They may serve as the medium of dissemination of public health information. Their purely Ayurvedic practice should be subject to supervision of special Ayurvedic Officers.

* * * * *

Resolutions passed at the Third Orissa Provincial Medical Conference held on the 7th November, 1949:

1. Resolved that this Third Orissa Provincial Medical Conference urges upon the authorities of the Medical College to establish a herbal garden in the vicinity of the medical college compound and cultivate in it the indigenous and foreign herbal plants under the control of the department of pharmacology and this conference further urges on the authorities of the University and the Medical College to include a course of study on herbiculture, identification, collection of herbal plants and preparation of therapeutic substances out of them.

2. Resolved that this Conference is of opinion that the fundamentals of the Science of Ayurveda should be studied by the Medical practitioners with a view to discover the hidden truths and incorporate the same in the practice of scientific medicine when such new discoveries will bring benefit to the suffering humanity.

3. Resolved that this Conference is of opinion that admission into Medical Colleges should be based strictly on merit aptitude, and physical fitness and not on the financial capacity of the parents and guardians of the students; with a view to implement this principle this conference urges on the Government to institute immediately a certain number of fully provided free studentships which should include free tuition, free-boarding and lodging, free supply of instruments and books, free uniform plus a pocket allowance, and in return these students shall execute bonds to serve the State for a specified number of years on a salary prevalant in the province at the time.

4. Resolved that this Conference welcomes the request of the Honourable Premier to prepare a scheme for immediately augmenting the production of doctors to remove the existing dearth of doctors in our province, this conference enjoins and authorises the Working Committee of the Orissa Provincial Branch of the Indian Medical Association to work out a scheme for increasing the production of all classes of health service personnel and examine the possibility of doubling the number of admissions of students into the medical college.

5. Resolved that this Conference appreciates the difficulty of the medical practitioners whose clinics and dispensaries are subjected to the inspection by the non-medical drug inspectors under the provisions of Orissa Drug Control Rules and authorises the Working Committee to collect all relevant information on the subject of drug inspection and qualification of drug inspectors and the practice in other provinces and formulate a well considered policy on the question and take up matters with authorities concerned.

6. Resolved that this Conference feels that all Licentiates should be given an opportunity to take up the Condensed M.B.B.S. course and this conference strongly urges on the Government of Orissa that admission into Condensed M.B., B.S. course should be continued for a few years more.

7. Resolved that this Conference is definitely of opinion that the environment and the family tradition of a doctor's household are positive assets to the production of future doctors imbibed with a certain degree of diagnostic and therapeutic intuition; this conference therefore feels that doctors' children should be given a preferential treatment in regard to admission into the Medical Colleges and this Conference strongly urges on the Government to reserve a certain percentage of seats in the medical colleges for the children of doctors provided they comply with the minimum qualifications laid down by the University and the Indian Medical Council.

8. Resolved that this Conference is of opinion that in the interest of sound basic medical education and of higher medical education and research the medical teachers should be whole-time and should be able to devote their whole time and energy to the care of the patients, teaching of students, encouraging research among students and undertaking research themselves; this Conference is of opinion that these ideas of medical education are not attainable in practice so long the medical teachers are allowed private practice; this conference strongly urges on the Government to abolish the privilege

of private practive for the medical teachers, in return of a better scale of pay than now.

9. Resolved that this conference is of opinion that a rural bias and a rural background should be introduced immediately into the curriculum of medical studies in India as a very large percentage of doctors in future will have to settle and practise in rural conditions; with this object in view this Conference authorises the Working Committee to frame a necessary scheme for this purpose and present the same to the Government, the University and the Indian Medical Council for their consideration.

10. Resolved that this Conference declares that the training of the Medical students is mostly devoid of realistic approach to the actual home surroundings and this conference is of opinion that domiciliary treatment service should be introduced into the medical curriculum; this conference authorises the Working Committee to work out the details of programme of domiciliary treatment service and training of the students therein and present a workable scheme to the Government, University and the Indian Medical Council.

11. Resolved that this Conference urges on the Government to take steps for providing shelter homes for the vagrant lepers and for providing treatment facilities for them there.

12. Resolved that this Conference notes with pleasure the recent efforts of the Government to increase the facilities for medical relief in rural areas and appreciates the action of those medical practitioners who have in recent years been settling in villages but the Conference feels that the amount of proper medical relief now actually available to the rural people is extremley inadequate; the Conference is definitely of opinion that the continued disinclination of the bulk of medical practice is due to certain unfavourable circumstances prevailing in the country side, like unequal competition against the quacks masquerading under various names and lack of ordinary amenities of civilised life; this Conference strongly urges on the government to provide the following facilities to the rural practitioners particularly to the medical officers posted to rural dispensaries in order to attract the medical practitioners to rural areas.

(*i*) Free supply of uniform,

(*ii*) Free supply of fuel and light,

(*iii*) Free education to their children in all educational institutions into which they gain admission by merit,

(*iv*) Provision of free furnished quarters.

This Conference notes with regret that although quarters are provided in rural areas, but they are unhygienic and unfurnished, no dispensary should be opened in rural areas until suitable quarters are provided.

13. Resolved that this Conference feels that private practitioners are subjected to great inconvenience and harassment by the Sales Tax department of the Government who insist on the maintenance of records for supply of medicine to their own patients and assess sales tax on the same. This Conference strongly urges on the Government to exempt the practitioners not owning Drug Shops from the operation of sales tax as has been done by the Government of Bombay.

NINTH BIHAR PROVINCIAL MEDICAL CONFERENCE, DARBHANGA

The IXth Bihar Provincial Medical Conference was held on 26th and 27th November, 1949 at Darbhanga under the presidentship of Dr. Rajeshwar Prasad of Arrah.

The Conference and the Exhibition were inaugurated by Sriman Raja Viseswar Singh Bahadur of Rajnagar Raj.

On 26th November the Conference was inaugurated. Chairman of the Reception Committee read the welcome address. Sriman Raja Bahadur read his inaugural address. Dr. Rajeswar Prasad, President of Bihar Provincial Association for 1949-50 delivered his Presidential address. Dr. G. R. Khan, M.L.A., welcomed the members and delegates on behalf of Licentiates Association and Dr. D. P. Dar, President of the Bihar Provincial Licentiates Association read his Presidential address.

The Conference was attended by over 400 members of the profesaion including 42 Delegates from the different Local Branches. Rai Bahadur Dr. T. N. Banerjee inaugurated and presided over the Scientific Section.

The following are excerpts from the Presidential Address delivered by Dr. Rajeswar Prasad on 26-11-49:

With the springing up of our national Government our objective should be the making of the Nation strong, vigorous, up-to-date and progressive. Our Association has always responded to any call to render assistance and given suggestions for good service with promptness. Behar has not lagged behind in national activities as is illustrated by one of its members taking a good part in speaking on a resolution and making out a case for adoption of B. C. G. inoculations in India and for adoption of mass miniature X-ray photography of chest in the Bombay Session of the All-India Medical Conference. The concrete result has been the invitation to experts from Norway and Sweden to visit our country. Behar extends its warm welcome to Dr. Svend K. Svendsen, Chief of the United Nations international Tuberculosis Campaign and Drs. Paul Andresen, (the present chief) K. Jyasum who have come here to launch B. C. G. Vaccination campaign in Behar. Also a mass chest radiography unit is soon going to be purchased at a cost of rupees one lac twenty thousand by India Government. A resolution adopted at the Dhanbad Conference also met recognition from the All-India Medical Conference, Bombay, though in an altered shape—that was on sending out medical men to America for training in Industrial Health and Medicine. The Bombay conference improved on our resolution.

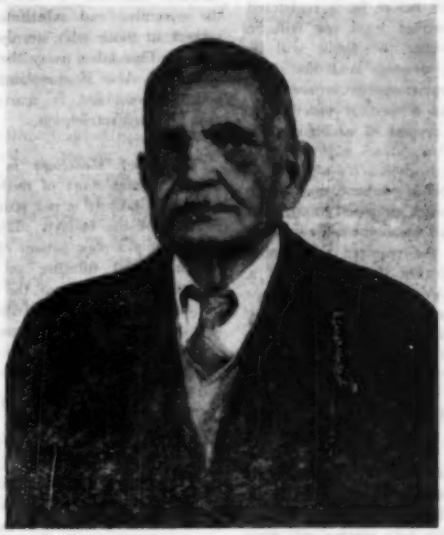
I feel delighted to see our session held here at the second centre of learning of the medical sciences in our Province. In major part it was the munificence of the late Maharajadhiraj Sir Rameshwar Singh of Darbhanga that gave rise to this institution which began with smaller ambitions. This institution by aid of Government is fast rising into a first rate competitor of the Patna Medical College (which also had his usual munificence).

Various imperfections of this college have been ventilated through the press as regards insufficient teaching staff, insufficient clinical material and want of equipment. I have no doubt that in proper quarters there must be prevailing the utmost desire to do all that can be done. But looking at things which attract notice I think we can offer some suggestions

with the hope that if found practicable these may receive consideration.

That there should have been a large influx of condensed course students at a given time does not look life foresight or prudent calculation. Hence the future batches should be smaller in size and reduced to manageable proportions and if the existing teaching staff even then is insufficient then an additional professor in each major subject on temporary basis is not beyond practicability. It is possible also to increase clinical bed-side teaching by a few hours by work on all working days of the week. Whatever be practicable should at once be done to give first class teaching. The disparity if any, between the number of Surgery professors or teachers between Patna and Darbhanga should be rectified. One is disposed to appreciate the disappointment of the condensed course students at being left with imperfect educational facilities at Darbhanga with the example before their eyes of the regular students migrating to Patna for continuing their studies in Patna Medical College. I feel that the grievance of the condensed course students is real. The great remedy appears to be to hurry up things and complete Darbhanga Medical College in all respects in the shortest possible time, reduction of the batches as regards number, improvising more beds and entertaining extra professors, lecturers or tutors in all major subjects for the time being. But things cannot be allowed to drift. The meagre time for completion of the college course given to the condensed course students should be so arranged that they are enabled to derive the utmost benefit out of the time placed at their disposal.

Further I like to point out that a very large number of applicants for medical education have been turned away for want of accommodation in the existing colleges. Keeping in view the recommendations of the Bhore Committee it is necessary to establish a third college in Bihar in the near future.



Dr. Rajeshwar Prasad
President, IX Bihar Provincial Medical Conference

This Association is thankful to the Bihar Government for recognizing the claims of medical men in the matter of admission of their children in the medical colleges. Admission was granted to the names submitted to Government by our Association.

Patna General Hospital—It may be useful to think how the overcrowding in Patna General Hospital can be minimised. The admissions are often double or even treble the sanctioned accommodation particularly in two wards—the female surgical and maternity ward of the Women's Hospital. I consider that the need for more beds is very urgent. It also struck me that linen and blankets are rather too short but this is a temporary affair and looked a trying hardship.

The present operation theatres are insufficient. Often two Surgeons are operating in the same operation theatre. The ingress and egress is through the main entrance. There is one common room for the preparation of the Surgeons and the main entrance is common access. I believe the aseptic operation theatres need to be remodelled on modern lines. Students' galleries should be so placed as to convenience full view of the stages of the operations, otherwise the full benefit of teaching is not afforded to students. Particularly now there must be available a new operation theatre for the high aseptic demands of joint and bone surgery which, I understand, is now being done in relation to orthopædic surgery. It is gratifying to see that the value of orthopædic surgery has been realized and a new ward reserved.

I have carefully scrutinized the recent communique from Government giving a new classification of Paying Wards.

The grading and charges appear to serve to exclude the middle class man and woman from getting any service at the Patna Medical College Hospital except that perhaps a scanty few rooms of class III may be available for the parturient.

The daily charges of most of the Paying Wards have been recently raised and pitched so high as to exclude all but the wealthy to enable admission. They can very well afford not only to call doctors of higher and mediate qualifications at their own houses but almost can command all facilities at their residence. It is not the wealthy who require paying wards. Also if this is allowed the private practitioners lose in practice. Some years ago, the Congress Government suggested the creation of beds available for middle class people on moderate charges inclusive of clinical investigations. So instead of more facilities to the middle class their claims have been curtailed. I appeal that the middle class should have an adequate number of paying wards available to them on charges within their means.

Midwifery—Scienitfic midwifery is non-existent in rural areas. It is unfortunate that there exists in the rural areas much morbidity and much infant mortality and that tetanus is common in the new born. It is a slur on the dignity of our profession and of our Province. In England it is within the right of every expectant mother to apply for midwifery aid and to obtain it without cost and some good money in addition for both mother and child. We here offer cold indifference to suffering and death.

Also the recent National Health Service Act of England has devised the Emergency Maternity Service which provides for skilled help being taken to patients requiring such assistance and unfit for transfer to Hospital. It has given ample

proof of life saving possibilities. It has been extremely costly. A consultant may have to run fifty miles in his car at night with blood-transfusion equipment. But our country has not too plentiful of consultants, neither the roadway nor the finance. When I write this I am led to think of the importance being given to spend after such things as Homœopathy and Ayurved and Hakimi and I feel a despair. I desire to impress that midwifery aid is the all too important national work to the exclusion of all else in medical aid. I request even a passing reference to the National Health Service Act of England so that we may be impressed with the duty of a nation towards the parturient.

Rural Medical Aid—There has recently been a proposal that in order to secure Rural Medical Aid, medical registration of a graduate should be withheld till he has put in six months service in rural work.

This proposal is to my mind putting the cart before the horse. With such a provision a graduate is required to practise like a full-fledged practitioner before he is registered as a Medical Practitioner. It is neither legal nor will be popular with young graduates. Neither the public will be benefited for various reasons. His newness and his short stay in the centre of new social environments is not conducive to any appreciable success as a medical practitioner and midwifery is out of question in respect of which matters have just been discussed.

There is another danger. A young graduate may settle in a village in his own home and although supposed to do rural practice in fact enjoys the affluence of his home and finds no hard labour to make it appear that the required six months of rural practice, has been attained. On the other hand a poor young graduate finds it doing hard work and has deservingly put in real Rural Service. The two different categories will probably receive the same recognition of having completed the pre-requisite condition for entry into service.

It is practicable to enjoin any condition, for entry into service, including the imposition of a bond to be executed by the entrant.

Admitting that finances are available it is practicable to entertain a sufficient number of doctors for rural areas given the condition that the remuneration is adequate. The present pay of an Assistant Surgeon on entry into service will probably be quite acceptable but as a doctor cannot work alone he must be allowed an assistant, better, a compounder-dresser. The number to be settled in each District may have to depend on finances. They should be allowed private practice.

Women's Side in Sadar Hospitals—Bihar is possessed of a phenomenon which does not obtain in other parts of India. There is a shortage of qualified Lady Doctors. Some, that are here, hail from other Provinces. There is a silver lining as Bihar girls are just taking to study in the medical line but the number of admissions is still very unsatisfactory. There appear to have been reserved in the Medical Colleges enough seats for them but the number actually applying falls short of the provided seats. Let us hope the outlook is changing and we may expect to have many joining the colleges in time.

Working in Hospitals and Dispensaries—Some of us are not quite free from blame of misusing time intended for indoor work. Time is devoted to other work unconnected with the hospital. The outdoor is sometimes wanting in certain things that will make a satisfactory examination of a patient, for instance, an ear speculum. I can cite attention to many other things. We must realize the responsibility. A little indifference may cost the patient prolonged visits and interfere with convenience of patients both physical, mental and economical too.

Formerly the medical staff working in a hospital or a dispensary used to be guided and encouraged by a superior professional person who was critical and checked his subordinate's work according to rules of the science and art of medicine and on sense of responsibility. This sort of right atmosphere is to-day being replaced by submission to another kind of authority—the fear of the complaint book kept in every outdoor. Every other consideration has been subordinated to this one. It has taken away the self respect from the executive and substituted the sense of self respect by respect to those who sternly demand some favour for themselves. This takes away the heart to work with professional morality. Also if complaints have been frivolous the irresponsible complaint is scarcely ever brought to book and awarded any retribution.

Stock of Medicines in Dispensaries—Most dispensaries always remain short of medicines particularly of the modern effective kind. It is not possible to stock these without much increase of the budget. This, therefore, must receive attention. Many a poor patient either gets merely the old Hospital pharmacopœial mixture or gets a prescription of costly medicines to buy from the open market or sometimes buy the ampoules from the Medical Officer's own stock purchaseable for price. It has seemed to me that there is room for abuse.

It is possible to devise a list of serviceable drugs without being extravagant that must be in stock. In respect of such drugs, bulk supply at contract rates on Provincial scale is possible. Efforts must at the same time be made to obtain cost price payments from patients who are able to afford. It requires a change in the mentality in the general population to be voluntary minded in the matter of payments for benefits received at hospitals and dispensaries. Will appeal by Public speakers help matters?

The appointment of I.G.C.H.—Under the British regime the I.G.C.H. used to be appointed on seniority and merit on an all-India basis. If in Bihar, the appointment is made by a group of official personalities who are not conversant with matters medical it is open to objection.. Also the appointments are liable to be made on power-politics or party-politics basis or as a reward for political work. I am unable to shut my eyes to such things as they have happened in the lower spheres. Nothing can be worse if that happens. Particularly if an I.G.C.H. is soft much injustice can be done. The appointment of the I.G.C.H. can best be left to the biggest representative body of medical men or at best power be delegated to them to nominate a panel of two names to select from.

Our Duties—Full responsibility has devolved on us, particularly as we are holding C.S. posts. In this position I request you to throw lustre on duties entrusted to you. There must not be any shirking of your duties. The shirking has happened even by the British I. M. S. This came to my knowledge privately through an I. M. S. himself who said, a private conference of I. M. S. personnel was convened and they were impressed that they should put forth better work quantitative and qualitative. No harm if I tell you about the same thing and enjoin on you full hearted high level work both professional and administrative. I must confess that I know of several cases where there was cause for self-introspection.

World Medicine—It is gratifying to note that there sat recently in Delhi the regional committee of the WHO and the Committee considered the difficulties of India in procuring medical supplies. Decisions are not yet known. Important items for manufacture of D. D. T. and supply of Penicillin was also discussed. Priority has been given to B. C. G. inoculation and nutrition problems have been considered. We must be on the watch for obtaining equitable share of benefits likely to accrue but we have to await details.

From the activities of the World Health Organisation in our country an impression is growing in my mind that so far as the science and art of medicine is concerned the whole world is one. Rightly therefore the same Committee considered the question of reciprocity of medical degrees to be observed in participating countries. As a matter of fact we are welcoming in our midst as illustrated in the B. C. G. campaign men chosen from Northern Europe to initiate us in the work. No country will lose for adoption of such reciprocity.

Industrial Medicine—As regards our Dhanbad resolution, due to dollar devaluation it is no longer practical to depute medical men for training in America however desirable it may be. The Bombay session of the All-India Medical Conference had improved on our resolution and recommended the establishment of one college of Industrial Medicine and Hygiene. In Bihar many industrial organisations are springing up. Men for medical care will be needed. General practitioners even though competent physicians need to seek instruction in order that they may successfully apply their knowledge to industrial service. Fortunately the India Government has started a college of Industrial Medicine and Hygiene but it will require time to be comprehensive.

Preventive Medicine—It is satisfactory to note that the Public Health Department is gradually undertaking the additional work of T. A. B. inoculation and we look forward to more general adoption. Fortunately if Chloromycetin be made available the problem of typhoid will be solved. Till then we depend on T. A. B. which can be done on a mass scale.

The pervailing cholera vaccination training is open to objection. A few months training in inoculation with cholera vaccine is merely technical. They do commit very bad mistakes. I know that recently two deaths amongst the inoculated occurred soon following the inoculation. This results from want of knowledge about the imminent susceptibility to full-fledged cholera if inoculated to an attendant in the stage of incubation period. The attack is merely hastened. No attendant should be inoculated without receiving dilute sulphuric acid in doses of a few drops in water daily till the negative phase disappears or some other substitute which will prevent cholera developing in such persons given simultaneously with the inoculations.

Rightly it has been pointed out that dietary articles must be available in such fashion as to be eaten without fear of contracting disease. The proper washing of utensils and dishes must be enforced and dietaries for sale must be put in glass cases.

It is not generally realized that the tempting ice cream is a store house of germs and street urchins know of it least of all. The hygienic preparation of ice cream should be standardized by law.

Epidemic Control—High officials should make it a point to go into details, should acquaint themselves as to how things are being done, during their inspection visits. They should not go to any district headquarters and return back to their own head-quarters without doing any substantial work. This is more needed to-day when the mass injections are entrusted to laymen whereas previously these were done by Health Officers or doctors on epidemic duty. Things appear to be going in a retrograde fashion.

Health Centres—Health centres should be immediately established at the head quarters of Districts. The initial expenses may be substantial but after a few months it may stand to be almost self-supporting in the larger towns. There is so much demand of clinical examinations in the Moffusil that at present people will run to Patna or Darbhanga at extra cost to obtain reports. The set up should be divided into two divisions.

A. Non-remunerative. This for all material which the Public Health Department wants to get examined for epidemic control. Samples of water for chemical analysis, of cases of bacillary dysentery in epidemic form. Adulterations of food, bacteriological examination of well water and pond water, throat swabs etc.

Surgeons' Conference—An event of importance was the holding of the All India Surgeons' Conference in the last week of 1948. It was replete with top rank lectures by surgeons of repute with numerous illustrations showing the great strides that neuro- and brain surgery have made. Concomitantly an excellent surgical exhibition was held. The event was of much educative value. We can very usefully imitate the conference on a miniature intraprovincial scale by a party of surgeons of this province visiting all or some of the places of surgical activity within the province. I have elsewhere stated that such parties might do well to see hospitals at work, and suggest what improvements will make for better work, or

the party may in return secure some newer knowledge or technique for its own benefit.

An Indian—Let us be proud and at the same time mournful that Mr. Subba Rao was an Indian on the Research Staff of the Lederle Company in America. His many contributions are noted in the Medical Bulletins issued by the Lederle company. He made substantial contribution in research work which resulted in the discovery of Folic Acid and what is equally important he contributed to the preparation of the synthetic drug useful in the treatment of filariasis namely Hetrazan. Alas! he is no more. He has brought credit to his motherland by association in Research work in America. Hetrazan was discovered by the joint efforts of research in chemistry, parasitology and pharmacology in vastly organised laboratories. It is in this way that new discoveries are made.

Educational Aids—I learnt cisternal puncture from a movie picture. The same depicted molecular changes that resulted in arsenic fastness in man.

Similarly the hypnotic and analeptic action of drugs were fully demonstrated on the screen. On addition of the solution the fishes fell down to the bottom of the glass jar containing water, rested on their sides and became motionless and when the opposite drug in solution was added they were roused from sleep and swam actively. I believe the teaching of medical chemistry can be very interestingly demonstrated on the screen. The movie films are more useful than epidiascopes. In the present state of the Darbhanga college these would have supplied a want. There is one good point in the movies. They provide entertainment in spare hours in addition to education.

Group Practice—The American example of group practice is slowly being copied in England. In U. S. A. it is working very well. The general practitioner has been largely replaced by group practice. A number of medical men, not necessarily of outstanding academic qualifications co-operate together in a single clinic. Its medical staff chose their own specialities. The individual cases receive the benefit of examination in several specialities by the Doctor members. The fees are handsomely paid by a Health centre having a large clientele which may exceed one lac members who contribute to the Health centre. Only those are attended to who are contributing members. I think this is the only solution of our own difficulties consequent on overcrowding of doctors in towns.

The Teacher and the Taught—The taught will be inspired by the personal example of the Guru. He will imbibe his teacher's conduct. No doubt this happens in most cases. There is much indiscipline amongst the Arts colleges but medical students have to realize the serious nature of the profession of their choice. That is why the WHO has recommended the taking of an oath after graduation. The WHO's reasons should be read in their Journal No. 1. Teachers have on them a newer responsibility of contribution to India's greatness and the teaching they impart should reflect this feeling. Teachers should also contribute to advancement of learning by writing in medical journals. There is a convention in other countries that a Professor must write articles in journals. Narrowness by teachers of any description has been immensely condemned by the WHO.

The claim of Patna Medical Journal on all of us is an obligation. Those attached to institutions have means at their disposal whereby scientific investigations are easier. Unattached men of eminence have extensive observations at their command. The younger men can make queries and the answers are part of duties of men in position to answer.

An example of rare medical service is afforded by an article by Dr. Paras Nath Sinha in the April number of the Patna Medical Journal which requires to be seen to be evaluated. It requires great professional honesty and great courage to confess the pitfalls. It is an example of what is demanded by our profession as regards medical ethics.

National Stature—We throw away the Kan, the rice dust and the rice water. The other countries make Vit. B complex out of it. The British garrison besieged in the Dardenelles took rice and the Indian camp followers took the rice water. The soldiers got beri-beri. The camp-followers escaped from getting beri-beri. To-day in our province the rice mills are playing havoc in removing much of the pericarp of the rice grains during the polishing process and thus they are guilty of false economy.

I desire to quote (Med. clinics 1939 May—Page 730). "The male adult born and brought up in the Eastern part of U. S. A. is apt to be defintely taller than his father and mother. These students were on an average 2·8 inches taller than their fathers and mothers—the factors largely responsible were calcium and protein. The average intake of milk on the part of the students was 450 c.c. of milk daily. The parents consumed about 200 c.c. of milk daily. The addition of milk in the diet of school children had a markedly larger influence on growth in both height and weight, the addition of milk in the diet of school children between six and eleven, the milk group made the largest gain and increase in height was 2·63 inches. Nothing can be clearer in pointing out as to what to do to increase the stature of the Indian Nation. Schools should have dairies with well fed cows. No other food replaces milk.

At the end of this discourse I desire to direct your attention to what Sir (later Lord) Moynihan has said in his book "The most important person in the operation room is the patient" and another observation by my own Professor Col. Charles who said "The wealth of the rich and the gratitude of the poor should be equal to you. You will be blamed for something you have not done and praised for something which you do not deserve. Take both alike".

I.M.A., WORKING COMMITTEE—In the proceedings of the Working Committee meeting held at Allahabad on 25-12-49 and published in page xxxiii of the April issue of the Journal, the name of Dr. B. Tirumal Rao, a representative from the Andhra Provincial Branch, was not included through oversight in the list of names of "Members Present". Dr. Tirumal Rao was present in the meeting and represented the Andhra Provincial Branch.

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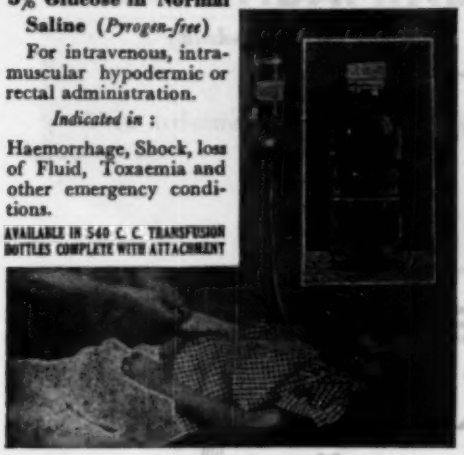

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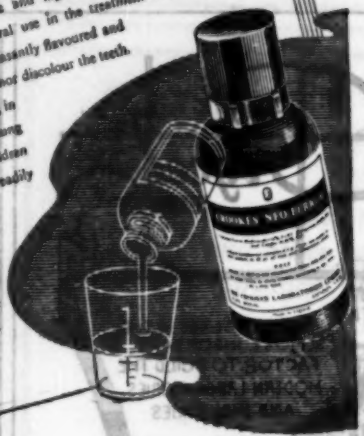

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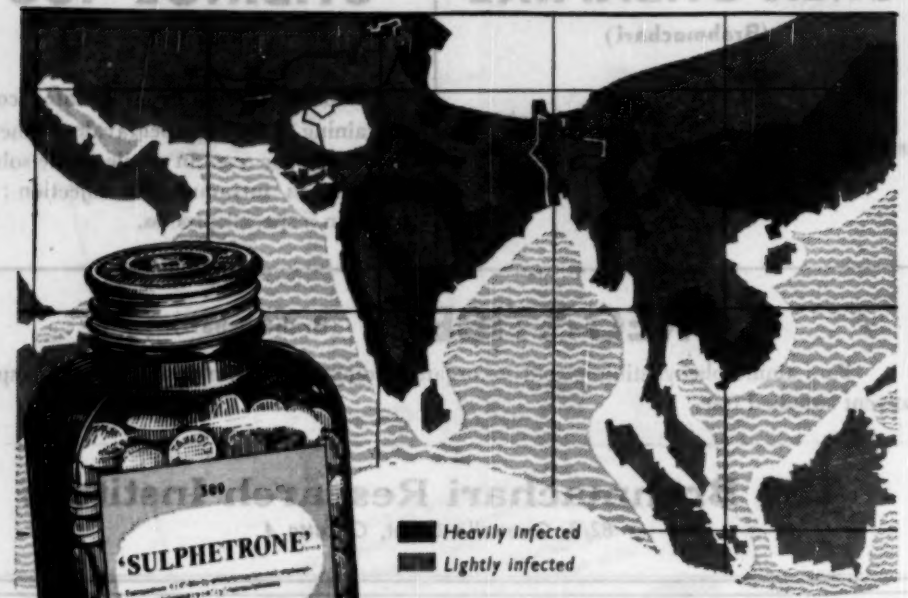

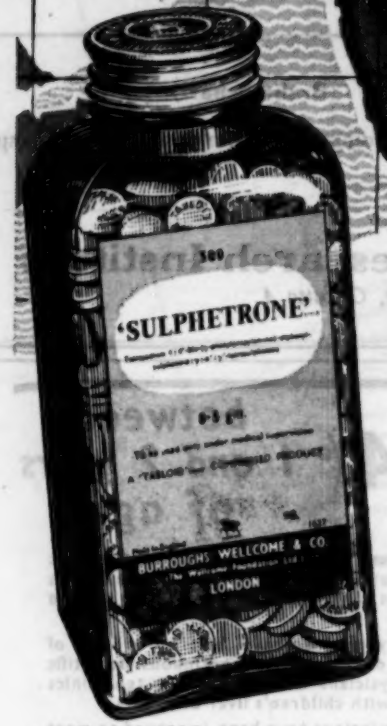

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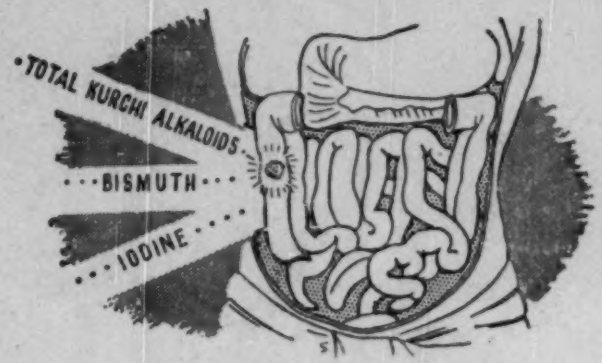

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